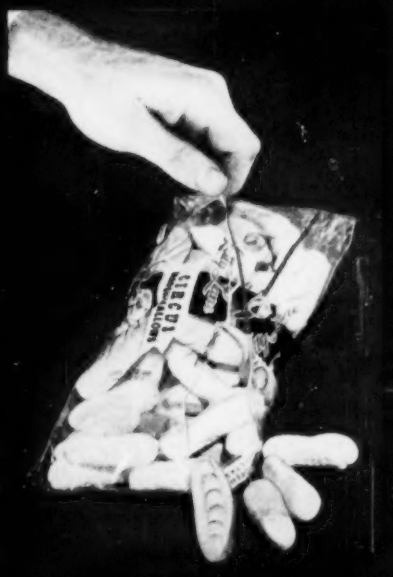
APRIL
1954

DIGEST

INTERNATIONAL BUSINESS AND INDUSTRY



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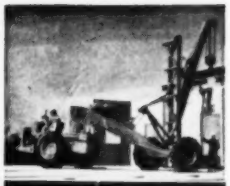

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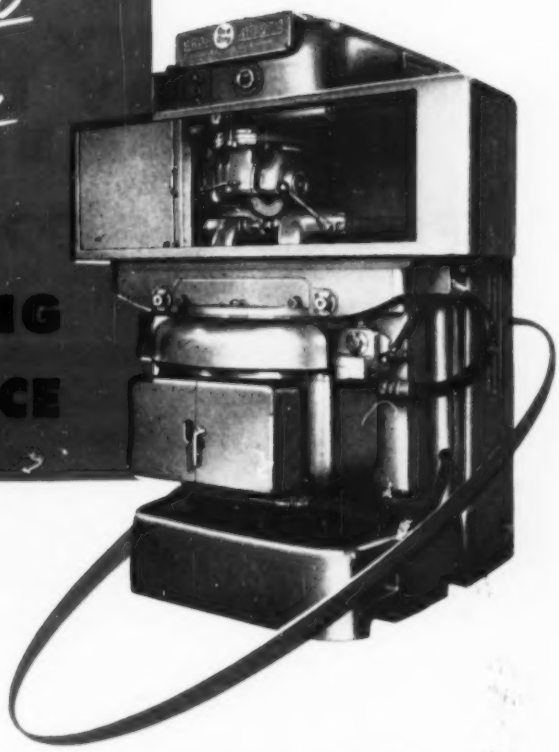
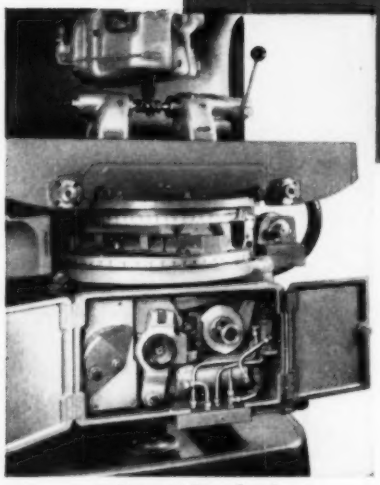
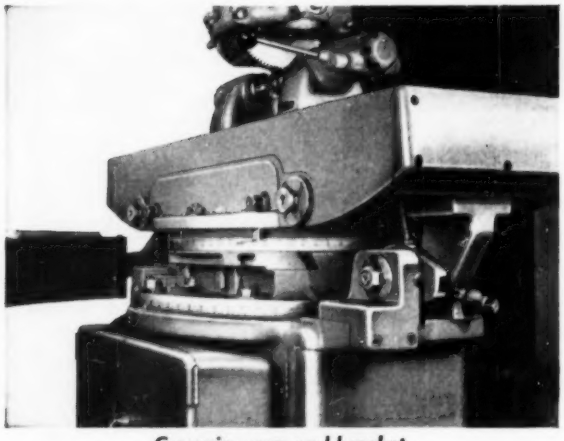




Differential up-feed mechanism



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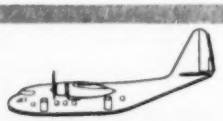

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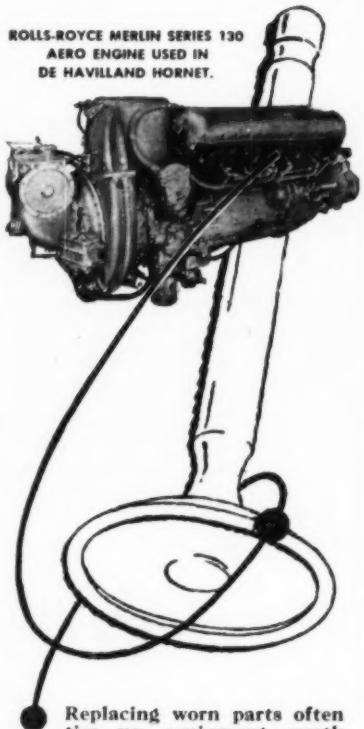

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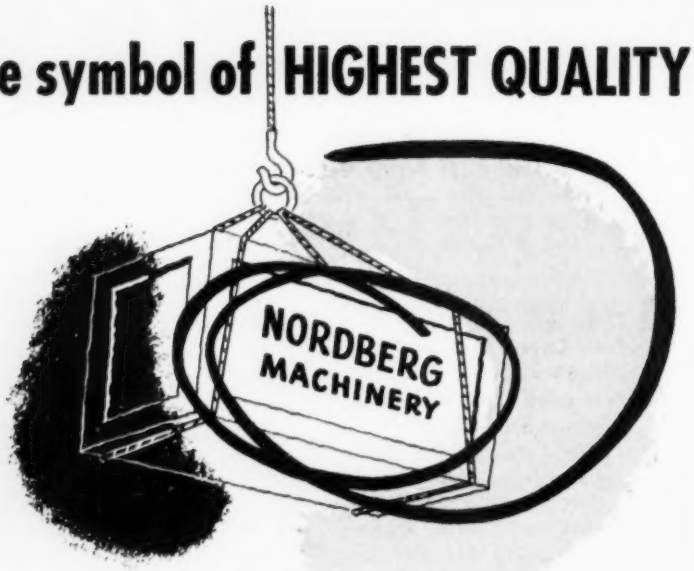

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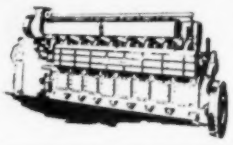

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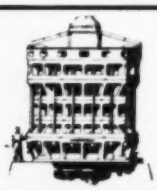

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MINE HOISTS

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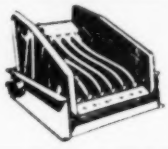

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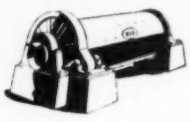

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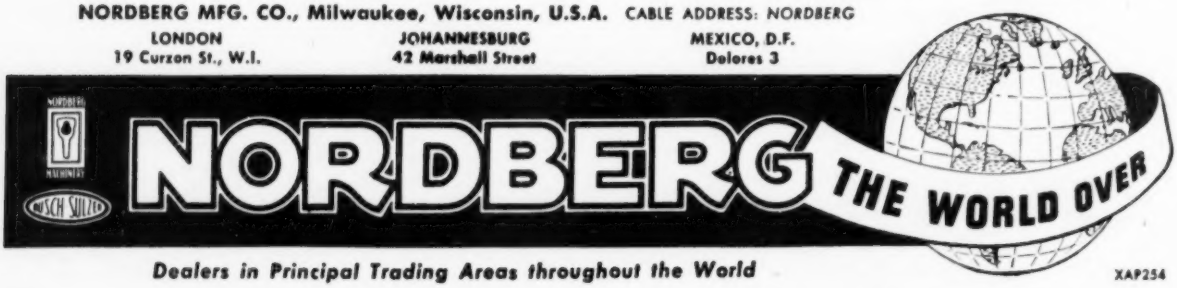

Dealers in Principal Trading Areas throughout the World

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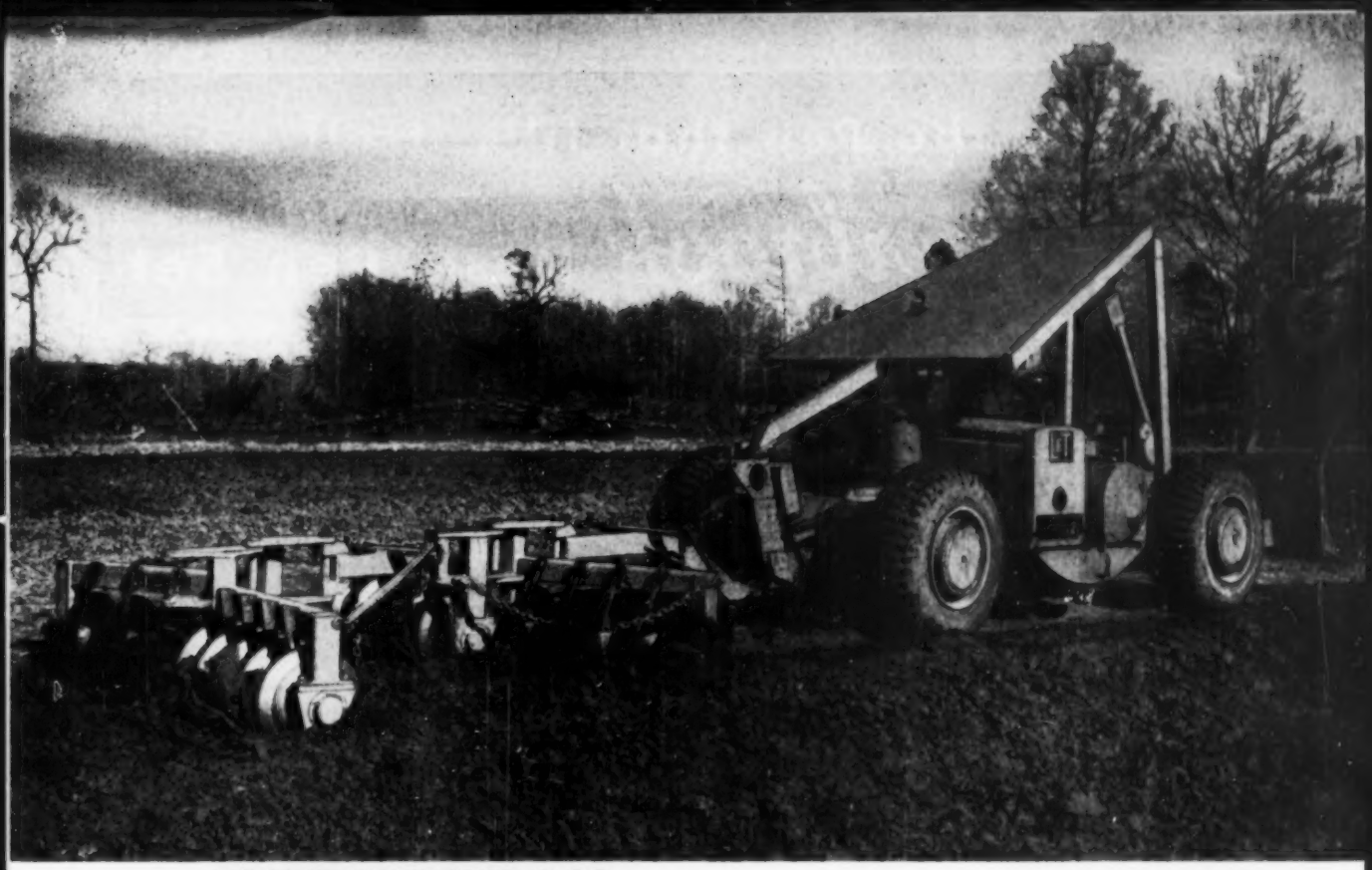

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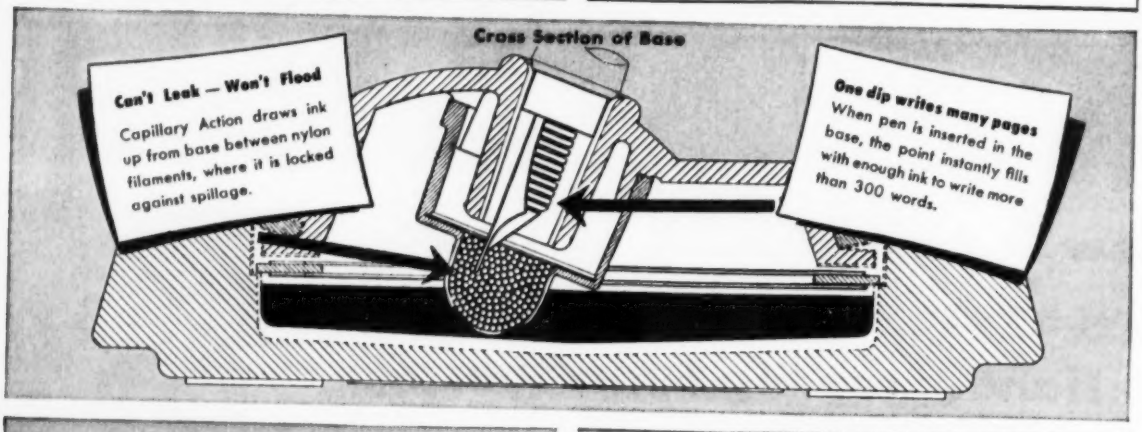
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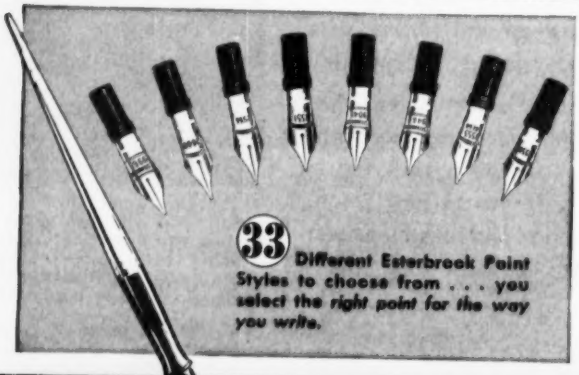

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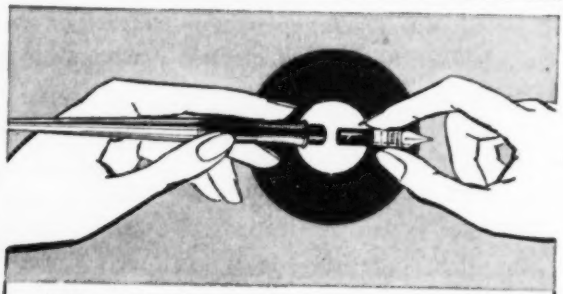

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BUSINESS TRENDS

U. S. BUSINESS faces a recession. So far, the economic factors do not indicate a major depression; the immediate outlook is mixed. These are the indications of recession:

• **Steel production continues** at only 75% of capacity. But some companies report more new orders. Other metals too are down and face further cutbacks in production. Copper output is down 7% from last year. Lead and zinc production is off 14 and 20% respectively.

• **Both bituminous and hard-coal operators** are witnessing further drops in their steadily declining market. The weather can be blamed for low demand in heating fuels, but industrial fuel demands also are down. No pickup is in sight for coal.

• **The automotive industry,** even after November and December model change-overs, is slow. The smaller producers have curtailed production drastically. Over-all industry production goal for the first quarter of 1954 has been reduced to 1,491,400 units—12% below previously planned schedules. Dealers' stocks of unsold new cars were at an all-time high of 600,000 units at the beginning of the current year. Even Ford and Chevrolet are considering the advisability of production cut-backs.

• **Unemployment is up.** The latest survey puts the jobless at 3.1-million—the highest since July 1950, when 3.2-million were unemployed. In the Detroit area alone, the unemployed amounted to 8% of the total working force. Labor, especially in Detroit, is demanding action, not talk.

But so far the recession is not serious because of these favorable signs:

• **Retail sales of soft goods continued strong,** off only 2% from 1953. Despite dips in some lines, hardware dealers reported dollar volume of sales topped 1953 by 0.3%.

• **New building begun in 1953** amounted to 1.1-million units, about the same as in 1951. Construction started during January was valued at $1.2-billion compared with $1.3-billion the previous month and $1-billion for January of a year ago.

• **Individual income reached an all-time high** of $285-billion. Installment credit is at a $21-billion peak. Individual "liquid assets" (cash, bank deposits, and bonds) totaled $216-billion. Even though production is down, particularly in the heavy industries, consumer buying power remains potentially high. This month, the start of the seasonal buying period, it will be possible to say whether the recession will recede or become more serious.

President Eisenhower has been keeping close watch on the situation. Should industry fail to pick up by April, the government will act. One hint of the approach the government might take is given in the recent governmental study of the zinc industry. To aid the industry, government stock-piling of zinc and a price-support program are contemplated.

In the meantime, the administration is expected to continue its easy credit policy. It is also counting on the passage of its 25-point tax-revision bill to stimulate lagging business. The removal of inconsistencies in taxing U. S. firms with foreign branches is planned to encourage U. S. business abroad. This will include permission to deduct dividends received from foreign subsidiaries.

FOREIGN-TRADE OUTLOOK remains good. In spite of the current decline in the U. S. business activity, U. S. imports are not expected to drop more than 5%. Dollars available to foreign countries will be around $19.4-billion, which is little changed from 1953 (exclusive of strictly military aid).

Government economic aid and other transfers will continue because sums have been already authorized. Dollar investment abroad is expected to reach $1-billion as compared to $500-million in 1953. U. S. commercial exports, excluding military shipments under the Mutual Security Program, are expected to rise by 5% from $12.2-billion to $12.8-billion.

EAST-WEST trade negotiations are brisk. A group of 33 British businessmen visited Moscow. Russia recently purchased large quantities of sugar from England and has offered a billion dollar trade deal extending over 3 years. Satellite countries are also apparently interested in foreign trade. Reports from Poland, Hungary, and Czechoslovakia speak of eagerness of these countries for trade with Britain.

France's trade with Russia may double this year, and a Russian trade commission is in Brazil. Several countries are discovering, however, that Russia and her satellites often cannot fulfill promises of delivery. Because of failure to meet payment promises, Sweden now refuses to ship iron ore to Czechoslovakia.

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INTERNATIONAL INDUSTRIAL POWER

WASHINGTON REPORT

EXPORT-IMPORT BANK'S lending policy will be relaxed. Treasury Secretary Humphrey clamped down on loans for foreign development projects last spring. State Department's John Cabot and Milton Eisenhower have been fighting for more development lending by the bank. Cabot's recent resignation spurred President Eisenhower to over-rule Humphrey.

The bank may lend more for development from now on than before the change. It will be able to lend from its own funds for development. And various ways of augmenting its funds through public financing—through World Bank type bond issues or underwriting private loans—are being considered.

WASHINGTON may move soon to stabilize some key commodity markets. The President's Minerals Policy Commission is studying two ideas:

- **Raising key stockpile targets.** This would mean additional authority to sign long-term contracts for procurement of foreign materials and additional lending authority for development of overseas resources.

- **Schemes for international commodity** stablization agreements. The Randall Commission opposed extensive use of such agreements but left the way open for specific limited agreements to be made in the national interest.

Domestic mining interests are sure to oppose both moves vigorously. But there is an even chance that something will be done, in the stockpiling field if not in commodity stabilization.

RANDALL COMMISSION recommendations for liberalizing U. S. foreign economic policy are meeting opposition within the administration. The Treasury Department is no longer eager for customs simplification. It has withdrawn support from the Jenkins Bill, which would liberalize the method of evaluating imports for duty assessment.

The administration will probably be unable to agree on new legislative proposals for simplifying customs classifications in time for congressional action this year. And the Treasury Department has teamed up with the armed services and the Interior Department in opposition to the Randall Commission recommendation that Buy American rules be relaxed by executive order.

The administration will probably fail to push Randall's recommendation that indirect subsidies for the Merchant Marine be scrapped. It figures Congress would be sure to oppose it.

Biggest single threat to trade liberalization centers on possible changes in the escape clause of the Trade Agreements Act. Randall urged that the President be given specific authority to veto Tariff Commission recommendations for duty increases under the clause in the national interest. Protectionists in Congress will try to rewrite the escape clause to define the national interest in such a way that the President would have less power to over-rule the Tariff Commission.

The new foreign economic policy is still in the discussion stage. The opposition to trade liberalization has not yet won. The administration and Randall still have not made their recommendations on the final draft of the program. But it will take strong action in the Cabinet and effective congressional liaison from the administration to make the Randall proposals effective.

You can expect some progress towards trade liberalization in any case. The Reciprocal Trade Act almost certainly will be renewed for 3 years. The President probably will get the additional tariff-cutting authority recommended by Randall.

Tax incentives will be granted to private foreign investors. The General Agreements on Tariffs and Trade (GATT) will be strengthened and refurbished at its next meeting in the fall, preparatory to asking congressional approval. That will give European nations, particularly Britain, added incentive to risk limited convertibility.

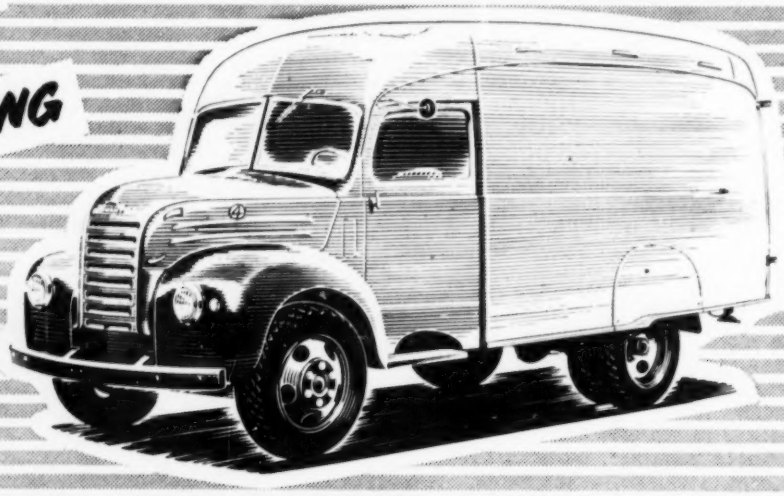
EUROPEAN PAYMENTS UNION may be strengthened by advancing U. S. funds, either as a loan or a grant, to help EPU amortize its backlog of old debts to the union. Deficits of over 18 months standing totaling $755-million would be amortized over a period of 3 to 5 years. The U. S. contribution to the operation was tentatively set at around $600-million.

The idea is that putting EPU back on a current basis would speed up liberalization of intra-European trade and permit members of the Organization for European Economic Cooperation to start scrapping quantitative restrictions against dollar imports.

Foreign Operations Administration is behind the proposal. But opponents claim that it would slow the pace toward convertibility to that of the weakest European economy. Final decision will have to be made by Eisenhower.

Mr. Transport Chief-

SCALE DOWN THOSE OPERATING COSTS WITH THESE TOUGH TRUCKS!



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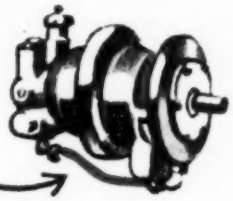
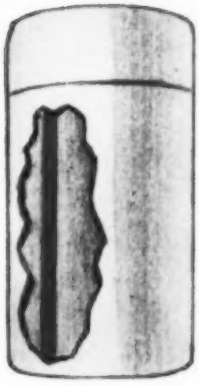


FLINT HOLDER FOR CIGARETTE LIGHTER



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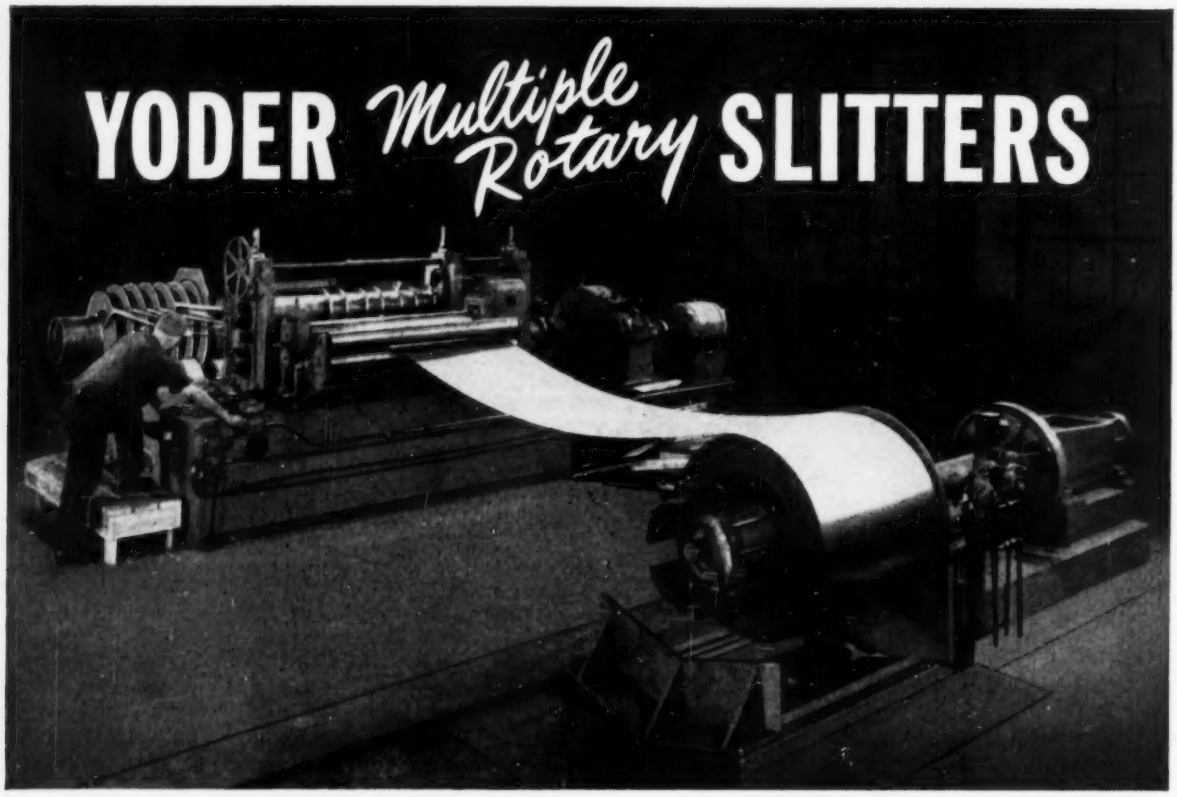

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If you use 100 tons or more of coiled strip or sheets per month, in special widths, the installation of a Yoder Slitter will pay four kinds of dividends:

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APRIL 1954
VOLUME 9 • NUMBER 4

McGRAW-HILL DIGEST

- Eisenhower, Congress, nearly everyone recognizes that present farm surpluses are a major troublesome problem in the American economy
- One way out is to finance economic development in under-developed countries by sending surpluses abroad to pay for development projects
- Chances look good for a new surplus disposal program that would be a help rather than just a dumping plan.—An original Digest article

Farm Surplus to Foreign Aid

WASHINGTON—Bulging farm surpluses are likely to keep the U. S. government in the foreign economic-aid business on an expanding scale for years to come. There is even a real possibility of a semi-permanent aid program that would finance economic development from India to the Andes with wheat, cotton, corn, oils, tobacco.

Political pressures are pushing in that direction. Congressmen are eager to cut foreign aid, but even more eager to keep farm voters happy. The easiest political way out of the spiral of high support prices and mounting surpluses is to move surpluses abroad.

The administration, at least temporarily, has slammed the door on farm sales to the Soviet bloc. Barter deals, such as butter for manganese, still are possible although none is being planned. But the main effort in the immediate future will be concentrated on finding outlets throughout the free world.

The pattern of the new farm-commodity foreign aid program is beginning to emerge. President Eisenhower called in his budget message for disposing of $1-billion worth of surpluses over 3 years in aid to friendly nations—$300-million of it in fiscal 1955.

Disagreement within the administration has slowed up publication of the details. Secretary of Agriculture Benson still has not been won over to the aid approach. He wants to move the surpluses through commercial channels and move them faster than could be done under the proposed aid program. The Department of Agriculture will send technical missions to Europe, Asia, and Latin America to look for new commercial outlets for farm exports.

But the farm-commodity aid program almost certainly will go through. Top officials in the State Department, Foreign Operations Administration (FOA), and the White House are behind it. They are convinced that substantial amounts of farm surpluses can be unloaded abroad only through a carefully planned, long-term aid program. Anything else would mean dumping.

Planning already is far advanced on the new program. FOA is working up a series of development projects in fourteen nations including Korea, Japan, Formosa, Philippines, India, Pakistan, Iran, Iraq and other Asian, Middle Eastern, African, and Latin American countries. These projects would be at least partially financed with farm surpluses.

A plan to set up an agricultural stockpile for the North Atlantic Treaty Organization to use in emergencies also is being laid down; it has a good chance of going through soon. Some knotty details still have to be ironed out, such as where to put the stocks so that they would be handy but would not be captured, and how and under what circumstances stocks would be used.

The big problem in all this planning is how to dispose of surpluses abroad without dumping them. Ambassadors from agricultural exporting countries have been badgering the State Department for months for assurances that the nearly $7-billion worth of U. S. government stocks will not be dumped. They have warned that this would set off a price war in world markets that would benefit nobody and upset a number of friendly governments.

FOA has been wrestling with the dumping problem at the practical level for nearly a year. Section 550 of last year's foreign aid bill called for supplying not less than $100-million and not more than $250-million of total economic aid in the form of surplus farm commodities. The legislation also banned dumping.

FOA required governments receiving surpluses as aid to guarantee that they would not interfere with normal imports of the commodities concerned from

friendly countries. Some countries were able to promise this by cutting back on imports from Soviet-bloc countries. Norway, for example, received $2,100,000 worth of soybeans normally imported from Red China.

Bolivia qualified for food assistance on the grounds that without it famine would occur as it had no foreign exchange to import food through commercial channels. Other countries got around the antidumping provision of the law by agreeing to expand their stockpiles of certain commodities. This agreement wrung protests from several agricultural exporting countries, which claimed there was no assurance that the stocks would not be run down later.

Question: Is It Dumping?

But borderline cases crop up where it is difficult to say for certain whether or not dumping is involved. Take the recent sale of $5-million worth of cotton and tobacco to Finland for Finn marks to be used for buying Finnish goods for export to countries as aid.

Everybody gains on the surface. The Finns got cotton and tobacco they otherwise would not have been able to buy because of lack of foreign exchange. They also get $5-million worth of guaranteed exports to markets that they otherwise could not have entered. The countries receiving the Finnish goods as aid benefit. The U. S. gets rid of some surpluses. But some competitors of the Finns on world markets are grumbling that the deal amounts to subsidizing Finnish exports, that it is mighty close to dumping.

Another such transaction is one under study whereby German contractors would work on Spanish bases under the U. S. military aid program and Germany would be paid in U. S. surplus agricultural commodities. As Germany has no food shortage, it is hard to see how the transaction could fail to reduce Germany's agricultural imports from other countries. German promises not to cut back normal imports could be bypassed by re-exporting the extra amount of agricultural commodities.

Despite these deals, FOA has had a tough time moving the surpluses without dumping them. Only $99-million worth has been shipped abroad so far. The program has gone so slowly that Congress may investigate it. Japan is slated to get $50-million worth of grain soon—$10-million as an outright grant and the rest to be sold for Japanese yen to finance the defense effort. This will bring up the total, but even so it will fall well below the ceiling.

Many countries have been reluctant to accept surpluses as aid under Section 550 as long as they had a choice of getting dollars instead. The new program would run for 3 years, which would give Washington more time to find outlets for the goods outside the normal channels of trade.

Under the old program, surpluses were sold for local currencies that were used in most cases to finance the local costs of defense projects already planned under the over-all military aid program. So it was difficult in many cases to prove that this actually added up to an increase in consumption of agricultural products, and not dumping.

The new program calls for finding low-priority development projects in under-developed countries with low diet levels and financing them with grants of farm surpluses. Normally such projects would not be undertaken for years in the absence of the surplus disposal program. Activating them would lead to a net increase in demand and theoretically to no disruption of normal trade channels.

Any increase of economic activity in under-developed countries with subsistence-level living standards, it is argued, leads to a proportional increase in consumption of commodities, particularly food. The wages paid Indian workers to build dams and dig irrigation ditches would be spent almost entirely for food and clothing.

The number of such projects around the world in limitless. But the maximum goal of the overseas surplus disposal program at the moment is to get rid of $2.5-billion worth of stocks. It is conceived as a safety valve to hold down surplus accumulation until the flexible supports requested by the administration from Congress start cutting into production.

But the thing could snowball. Flexible supports might not cut back production in the short run. And Congress might be reluctant to approve them if it looks as though surpluses could be unloaded abroad.

Once a big program got rolling, it would be hard to stop. This prospect makes orthodox government economists shudder. They fear it would perpetuate artificially high farm price supports, put the Commodity Credit Corp. into state trading in a big way for good, and constitute a major road block to progress toward a free multilateral world economy.

To Speed Surpluses Abroad

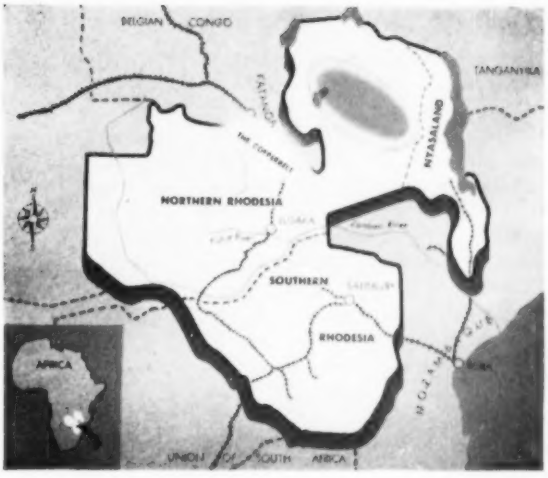
One thing is certain. Congress will constantly urge the administration to speed up the flow of surpluses abroad. Several bills calling for outright dumping have already been submitted.

The hottest bill is sponsored by Senator Andrew Schoeppel, of Kansas. Backed strongly by the Farm Bureau, it would authorize sale abroad of up to $500-million worth of surpluses per year for soft currencies. Private traders also would be permitted to sell abroad for soft currencies redeemable by the U. S. Treasury. There would be no adequate guarantees against dumping.

Most agricultural exporting nations sell only for dollars or sterling so they would find it hard or impossible to hold their markets. As the U. S. would be able to use its soft currency receipts as it wished, it could not very well ask foreign buyers to agree not to cut imports from other nations.

The administration will have to keep its farm-commodity aid program rolling fast if it is to avoid being saddled with some such dumping policy.

Rhodesian industry is increasing in world importance, but its position is uneasy for beneath the apparent calm simmer the racial question—and troublesome economic problems too



Africa's Industrial Color Bar

THE ALL-CONSUMING DESIRE of Cecil Rhodes was to build a United States of South Africa with equal rights for all civilized men. Today his hopes for Africa, seething with racial tension, seem faint. However, there are businessmen, both European and American, who have hopes that an explosion can be averted. Business is deeply involved in this issue. This is particularly true in Northern Rhodesia's copperbelt, the free-world's third largest source of copper. For it is squarely in the midst of a crisis in racial relations that is shaking all Africa south of the Sahara.

The two great copperbelt mining trusts, Anglo-American Corp. of South Africa and American Metal Co., Ltd., believe that an explosion can be averted and that they will have a lot to do with averting it.

The Africans are pressing for an equal right to work alongside the white man. And the most potent barrier to African advancement is the industrial color bar, which prevents natives from moving into skilled jobs. The copper companies are trying to break down this bar, but it is not easy. Recently, the European workers at one major mine voted, after a year of prodding, to lower the color bar. Repercussions echoed throughout Africa and the West—bitter recriminations from the white nationalists of South Africa, soul searching from the white settlers in Rhodesia, applause from diplomats and businessmen in Britain and the U. S.

London has been intensely interested in reaching some sort of solution to the twin extremes of Mau Mau fanaticism and the uncompromising white supremacy of the Union of South Africa. Last year a Central African Federation was proposed, aiming at alleviating racial tension through political and social association for the Rhodesias and Nyasaland. It provides for federal government as well as separate territorial law similar to American states' rights.

The federal government would have authority in foreign affairs, defense, immigration, banking and trade, transportation and education. Most other powers would remain with the territorial governments, including land policy (most important to Africans), trade unions, and advancement for natives. Safeguarding native rights would be under the jurisdiction of an African Affairs Board, made up of Africans and whites.

London also maintains the immediate economic case for federation is strong. Southern Rhodesia's coal and agricultural products complement Northern Rhodesia's mining economy; Nyasaland has a natural labor pool, and its natives can look for better wages in the Rhodesias. The copperbelt is the economic axis of the federation and events in the copper mining area will greatly influence the future of the federation.

Foreign governments are equally concerned with the copperbelt's future. The U.S. Raw Material Policy Commission reported that U. S. imports of copper may double by 1975. Northern Rhodesia ranks right below Chile as a producer, and there is vast potential for expansion. Today, the copperbelt is the British Commonwealth's major source of copper. As opposed to the dollar copper of the U. S. and Chile, Northern Rhodesia has saved the sterling area hundreds of millions of dollars in foreign exchange.

The copper men aren't trying to pose as crusaders in the racial problem; they realize the dangers inherent in meddling. But they feel that enlightened self-interest forces them to act. They need labor and they must upgrade native skills to get it. Above all,

they believe the present racial situation is untenable.

In Cape Town the color bar is written into the law. In the copperbelt the color bar is only part of a labor contract with the European mineworkers. They insisted on it during the war, and the law has stuck despite many official recommendations to drop it.

Last spring, management at the Roan Antelope Copper Mines came out squarely against the color bar and urged its white workers to wipe it out. The campaign was kept up and recently the Roan Antelope branch of the union of Europeans agreed in principle. However, the union demanded in its place the principle of equal pay for equal work. Equal pay means equal facilities and would mean the construction of clubs, swimming pools, and housing. It would be economically impossible, say the copper executives. There's hope that negotiations will bring a compromise.

Other companies approve this approach. Roan Antelope is carrying the ball for those who cannot afford to move so quickly. This applies particularly to those companies that do a major part of their business with South Africa.

Copperbelt industrialists tend to adopt an air of optimism about the outcome. They are plowing a good share of their profits back into the mines, and are tackling other problems that block copperbelt development.

Power is scarce. The four large mines have gotten together and, with the help of U. S. Export-Import Bank money, will increase power output. A hydroelectric scheme on the Kafue River is planned, and a contract has been signed with authorities of the Belgian Congo to draw hydroelectric power across the border when new plants are ready.

These are long-term improvements. From the short-term view, the copperbelt faces an economic adjustment. Since the war, copper earnings have soared. Last year Chile's hold-out of copper stocks gave the Rhodesian producers a big lift. Now Chile is coming back, copper prices are declining.—Business Wk, Jan 23, p116

Push-Button Load System Handles Six Sizes of Coal

Coal delivered directly from the mine breaker to truck should offer a speedy, economical means of procurement by industrial users, wholesalers, and direct retail haulers. With this in mind, Philadelphia & Reading Coal & Iron Co. set up a two-man "push-button" operation.

The trucker can draw an exact weight of any of six common coal sizes. After pulling his truck into position under the proper bunker, he notifies the operator of the desired tonnage. The operator simply sets a dial for this figure, then presses a button beneath the dial. Measurement is entirely automatic.

A chute is lowered into the truck to the right level by the operator, and a flight feeder begins operation, delivering the coal at 5 tons per min. As the load pours into the truck, the chute is lifted by push-button control to distribute the load and prevent jaming. When the dial completes its preset circuit, it breaks the connection, the feeder stops, and the chute is raised back into position so that the truck may pull out unhindered.—Coal Age, Jan, p68

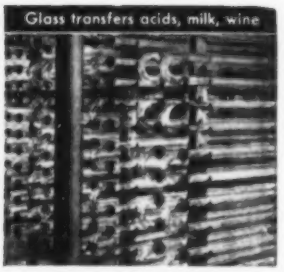
New Insulating Glass

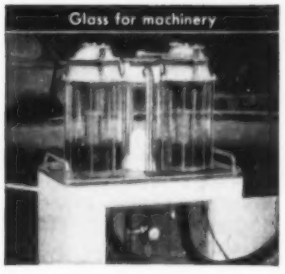
New products, stimulating the glass industry, include an all-glass double-glazed insulating window. It consists of two layers of ¼-in.-thick glass separated by a ⅜-in. air space. The edges are electrically fused to make a glass-to-glass seal. Air between the two panes of glass is replaced during manufacture with dry air.

The new glass, called Twindo-Weld by its manufacturer, the Pittsburgh Plate Glass Co., is specifically designed for residential glazing, apartments, schools, and similar buildings. As edge conductivity is eliminated, it is particularly desirable for refrigeration and air-conditioning applications.—Ceramic Ind, Feb, p69

Modern Executive-Office Lighting

Remodeled windowless office building of Heppenstall Co., Pittsburgh, features flexible modern lighting techniques and decorative schemes to get comfortable lighting and daylight effect. Luminous panels in ceiling and a 6x24-ft. lighted mural give the daylight effect and spaciousness to executive conference room. Eight 4-ft.-square recessed Frink units, installed in two rows, provide 83 footcandles throughout room. A Curtis reflector unit, set flush in the ceiling, contains a single row of six 40-watt fluorescent lamps to light the mural.—Elec C&M, Jan, p76





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Glass by Corning can be fragile or tough, solid or porous, transparent or opaque. It is an insulator but can be made with an electrically conductive surface. It can be compounded to meet such specific problems as corrosion, heat, or abrasion. It can be made into many shapes such as cylinders, vessels, flatware, pipelines, household ware, jewel bearings, parts for appliances and machines, etc. *What's more, glass by Corning is available now and at low cost.*

In the hands of Corning technicians glass has been made to do all sorts of jobs. Over 50,000 glass formulae are catalogued. More than 400 different glasses are in current production. It has taken years of "research in glass" to produce these developments.

That is why Corning suggests that "you name it." Chances are that the characteristics you require will be within the vast framework described above. Corning engineers are well qualified to determine the feasibility of any design or to recommend changes that will permit a satisfactory solution to the problem. As a starter, why not send for the booklet "Glass and You," which illustrates countless ways glass is being used in industry and home today.

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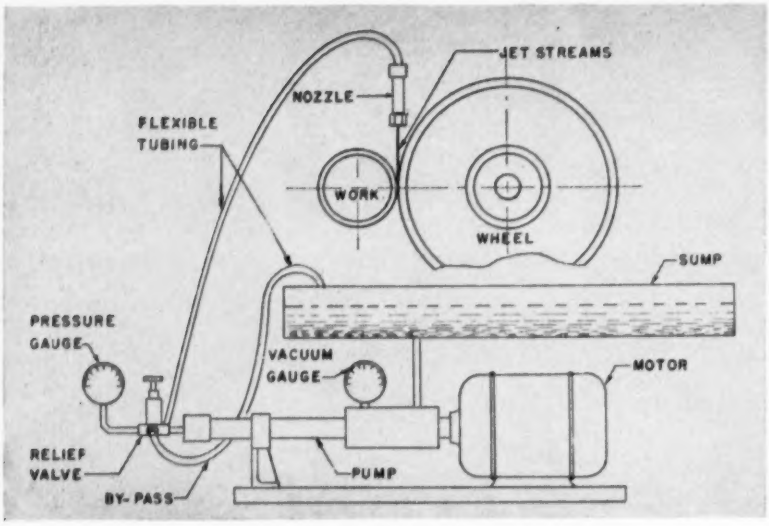


Jet Cooling Triples Grinding Speed

Reports from Thompson Products, Inc., on successful field tests indicate merit of Hi-Jet cooling (McG-H Digest, Apr '52, p50) in plunge and thread grinding. A Cleveland thread-gage manufacturer, with conventional cooling, ground gages of Rc 62–64 high-speed steel at infeed per pass of 0.020 to 0.025 in. Jet cooling allowed feed increase to 0.060 in. In plunge-grinding test at Carborundum Co., no discoloration or burn appeared at a feed of 0.020 in. per sec. With conventional cooling, discoloration showed at 0.005 in. per sec., burn at 0.010 in. per sec.—Am Mach, Jan 4, p137

Hi-Vac Unit Speed-Dries Heat-Sensitive Liquids

New machine, in only a few seconds, removes moisture from concentrated liquids or slurries to 1% residual. Pennsdale, Inc., has been using it to produce instant coffee in a dry, flaky form from a 38–40% solid-content concentrated coffee solution.

The dryer, made by Chain Belt Co., also has been applied to removal of moisture from other heat-sensitive foods. Among them are milk, molasses, protein hydrylosate, tea, fruit and vegetable juices, vitamins. Promising applications include baby foods, cereals, pulped fruit, vegetables, egg whites.

The unit draws a vacuum in the drying chamber with three-stage steam jets. Mounted inside the chamber are two drums serving as pulleys for a stainless-steel belt. Large drum is steam-heated; the small is water-cooled.

Food to be dried is fed to the belt in a film of controlled thickness. Radiant heaters over the belt increase the drying capacity by 100%. The dried food is cooled as the belt passes over the cooling roll, and is discharged through two air locks.—Food Eng, Jan, p36

New Wildcat Technique

In Topanga Canyon near Los Angeles, a wildcat oil well is being drilled on a location selected solely because of bacterial residue in the surface soil. The well is the first publicly announced test of the theory that certain bacteria thrive above oil accumulations and leave residue in the soil.

The theory was advanced by Dr. Claude Zobell of Scripps Institute of Oceanography. It holds that desulphovibrio bacteria colonies in the soil through geologic ages—fed constantly by slow leakage of ethane and propane from an underlying oil reservoir—leave fossil remains and current bacterial growth in the form of a pattern.

L. H. Goodknight, who is drilling the well, claims that with this technique he had recommended the site of a successful Kansas wildcat well.—Oil & Gas J, Jan 18, p54

New Ammonia Process Has High-Pressure Reformer

New ammonia plant of Shell Chemical Co. incorporates a process developed by M. W. Kellogg Co. An unusual feature of the process is a reforming step that takes advantage of the high pressure of the natural gas to produce synthesis gas at high pressure, thereby saving compressor power.

Natural gas is fed to the reforming furnace, which converts about 70% of it into raw synthesis gas. The mixture is charged to a combustion furnace to reform the rest of the natural gas, quenched by water, and then purified by converting carbon monoxide to carbon dioxide and removing the carbon dioxide.

The synthesis gas passes through oil separators, in which it mixes with a recycle stream from the primary separator. Then it passes through the secondary separator to remove ammonia contained in the recycle. The gas is charged to catalytic converters, which employ layers of catalyst with gas cooling between layers.

Product gases from the converters are cooled. Anhydrous liquid ammonia separates out in the primary separator and, after further cooling, goes to the anhydrous product flash drum.—Chem Eng, Feb, p105

News About Fibers

▶ **Dull nylon yarn** is in full production at Du Pont. It will sell at a small premium over semi-dull nylon, and is available in 30-, 40-, 59-, and 70-den. weights.

▶ **Recommended percentage** of Fibrolane, Courtauld Ltd.'s regenerated protein fiber, is reported to be up to 43½% in blends with rayon and up to 50% in blends with wool.

▶ **Knitted winter underwear** for women and children is being made of blends of Dynel and combed cotton. Blends of 50%-50% and 25% Dynel and 75% cotton are being used.

▶ **Doped-dyed** rayon filament yarn is being produced by American Enka Corp. Twelve colors are made.—Textile World, Feb, p248

Structural Magnesium in Aircraft Production

Wright Air Development Center recently evaluated the use of magnesium in aircraft construction as a means of cutting costs and conserving aluminum. WADC's action is based on the premise that the inherent advantages of the material can be made effective only in a full-scale aircraft program.

Evaluation was based on performance, structure, safety, procurability. These are the findings:

• **Strength-to-weight ratio** of complete magnesium structure appears equal to that of an aluminum structure.

• **Stiffness**—Generally better than magnesium. Generally lighter and weaker magnesium will be used in thicker cross sections.

• **Temperature limits**—About the same as for aluminum, 250 to 300°F. Magnesium alloys however have withstood temperatures as high as 500 to 600°F. without much loss in strength.

• **Stress concentration**—Low plastic deformation makes local stress concentration designs important. Care must be taken to avoid stress raisers.

• **Corrosion**—Of all structural metals, magnesium is the most susceptible to corrosion. Yet experience with the B-36, the Sikorsky helicopter, and the F-80 wing shows that the problem can be kept under control.—Aviation Wk, Dec 28, p34

Jeep-Powered Equipment Does Many Jobs Cheaply

A Willys Motor Co. dealer in Pennsylvania is making the versatile Willys Jeep even more useful for contractors. The dealer furnishes and installs almost any construction equipment the Jeep can carry and operate in the field.

The dealer puts a 200-amp. generator, driven by V-belts, on a Jeep and adds an oversize exciter to provide night lighting when required. Gas bottles and other equipment to make almost all types of welding practical can be carried.

Another handy adaptation mounts a 60-cu.-ft.-per-min. air compressor and receiver tank. Suitable drills, jackhammers, and tampers or pneumatic power tools can be included. This Jeep can mount a bulldozer blade for backfilling and light earthmoving.

A backhoe attachment can be mounted on the rear and operated hydraulically. A toothed-chain trencher attachment is handy for many small, confined ditching jobs.—Const Meth & Equip, Feb, p83

Largest Lighting Unit

What is believed to be the largest single suspended lighting unit ever constructed has been installed in the library at Massachusetts Institute of Technology, Boston. The "chandeluminaire," as it has been named, has a diameter of over 50 ft. and weighs 16 tons.

The lighting load of about 14 kw. consists of 92 72T12 and 144 48T12 fluorescent lamps. Light diffusers are made of corrugated Plexiglass. A unique feature is the installation around the outer edge of the huge circular lamp of 28 light, hollow, acoustical metal baffles, perforated for sound absorption.—Elec C&M, Feb, p101

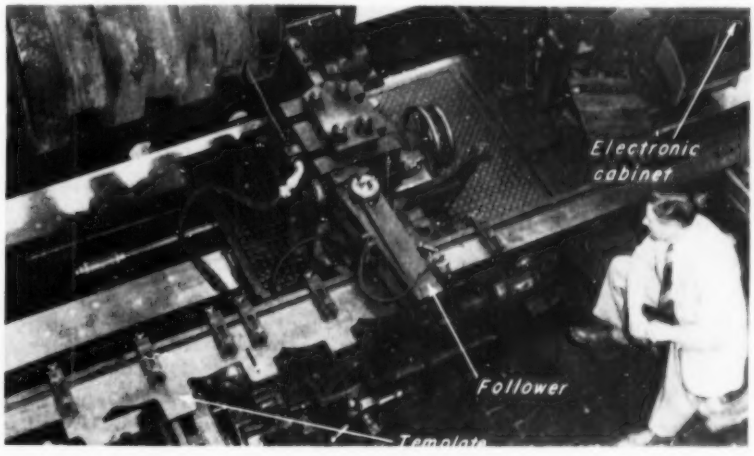
Acrylic Paints Offered by Mail-Order House

Water-based paints, including acrylics, are attractive to the painter because they dry fast, are relatively odorless. Other advantages of acrylics: No colloid is needed to maintain a suspension. Acrylics can be tinted with calcium pigments, formulated with hard waters, require no special manufacturing techniques. The emulsion can take a high pigment load. And acrylics can be applied even to wet plaster.

Rohm & Haas introduced Rhoplex AC 33 emulsion last spring, and only 2 months ago American Polymer Corp. announced acrylic-emulsion production. Montgomery Ward and Inertol Co., Inc., are two companies offering acrylic paints.

Acrylics are far from limited to home decorating. Socony Paint Products Co. is making Socoplex industrial coatings based on Rhoplex AC 33. Acceptance has been good.

With acrylic paints going into mail-order houses, these paints are going to make a strong bid for a share of the market.—Chem Wk, Jan 9, p42



Electronic Duplicators Control Roll Lathe

Voltage signal, produced by deflection of a floating stylus on a full-scale templet, operates both cross-feed and longitudinal-feed motors on Mackintosh-Hemphill Co.'s new steel-mill roll lathe. Roll machining time is greatly reduced; reproduction accuracy is within 0.001 in. Duplicating equipment, made by Raytheon Mfg. Co. and Voss Engrg. Co., interprets signal from the follower and delivers power to either or both motors, as directed. Both duplicators use same signal, one interpreting it directly and the other balancing it against a reference voltage.—Prod Eng, Jan, p156

Every Type of Telephone Cable From One Source... *ISE!*

Whether it's cable to serve a few portable telephones, or to build a vast network of communications—you can look to ISE, associate of International Telephone and Telegraph Corporation, for every cable need.

This worldwide service provides telephone cable of all types, in every gauge and quantity—for aerial, duct, submarine, and subterranean installation. Local exchange cable, long-distance audio frequency cable, multi-conductor carrier frequency cable, coaxial cable, special cable for television or other uses—ISE provides them all!

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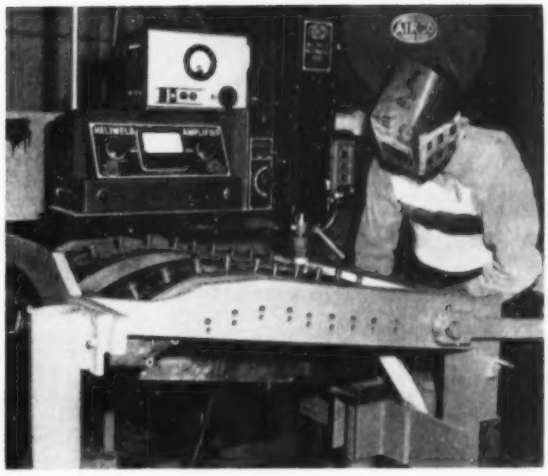
This Month's How To . . .

. . . arc-weld irregular contours

New automatic inert-gas-shielded arc welding machine at Ryan Aeronautical Co. welds around corners and over irregular surfaces. The electrode follows the peaks and valleys automatically and deposits uniform welds.

The Air Reduction Heliweld unit has a floating head, which is electrically controlled to respond immediately to changes in arc voltage. Welding equipment is mounted on a Linde side-beam carriage. An electric motor drives the carriage back and forth; an electronic control eliminates speed variations.

For each part, Ryan builds a fixture with pneumatic clamping and counterbalanced side frame.—Am Mach, Feb 1, p107



. . . blow-vacuum electrical equipment

Blowing equipment, particularly electrical equipment, usually results in rearranging the dirt. So Otis Elevator Co. has substituted a blow-vacuum system. Components of the set-up are a hand blower, a heavy-duty vacuum cleaner, and a cover of heavy cotton drill that is dropped over the equipment to be cleaned.

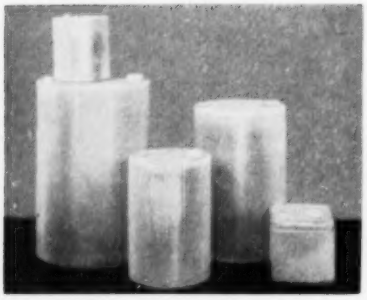
The cover, coated inside and out with oil-resistant neoprene, has 15 strategically located 2-way zippers. When equipment is set up, blower nozzle is inserted in one zipper opening. Then the vacuum hose with suction bell intake is inserted through another zipper. Dirt blown loose is sucked up by vacuum. No dust escapes, so no cleanup is needed after the motor-generator set is finished.—Power, Feb. p128

. . . get better supervision in your plant

Open office units, out on the plant floor, let foremen observe the areas they supervise without sacrificing privacy. The foreman's 6x7-ft. glass-walled office is elevated 22 in. In the L-shaped, floor-level section of the 12x14-ft. wood-and-plywood unit, a timekeeper-dispatcher-clerk keeps work schedule details.

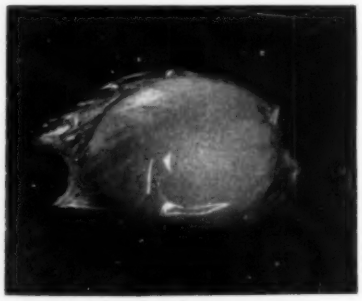
The unit has a schedule board with file slots for data on each machine center, a four-drawer file cabinet for permanent set-up cards, and an easy-to-reach telephone in a wall niche. On the counter are containers for shop orders and a rack for pads of departmental move tickets. Numbers on the tickets are large enough to be read by truckers without leaving their vehicles.—Factory, Feb, p118

These Packages Led 1953's Packaging Parade



Polyethylene Liners

Shrink-Wrap for Sausages

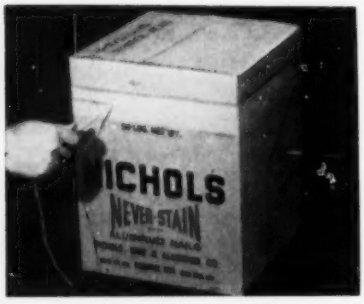


Film-Wrapped Citrus

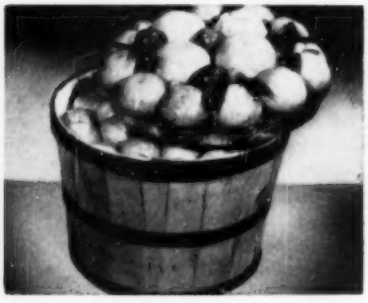
Vacuum-Packaged Hosiery

Flexible Vinyl Tubes

Package That Molds Product



Tear-Tape Shipping Case



Foil Tray for Fruit

Glass-Like Fine Pottery

Packaging Guide for 1954

A wealth of new ideas points the way for packaging to help you do a better job selling your product in what may be a highly competitive period

THIS YEAR'S PACKAGER will reap the benefits of the progress made in 1953 in the packaging field. Some developments may well carry your products to new highs in sales. New or expanding applications involve just about every material and container form used in packaging.

Polyethylene-coated cellophane is one of the real packaging highlights of 1953. It combines the qualities of both materials at a cost lower than would be involved in laminating two separate films. Cellophane permits good clarity and polyethylene provides better protective qualities. The new material offers significant possibilities for specialty packages where the combination of clarity, strength, and handling on automatic equipment are of value.

Unit- and strip-packaging needs (McG-H Digest, Nov '53, p38) have

sponsored development in the entire field of flexible materials, involving single webs, laminations, and special surface treatments. Many new types of products and new marketing opportunities have spurred interest in flexible packaging materials.

Plastics in packaging saw considerable growth last year. Vacuum-formed acetate "blisters," or domes, are now widely used with carded merchandise. Recent developments include methods that permit the merchandise itself to become the mold for the package. Special merchandising advantages are provided for items such as instruments, toys, hardware, and any rigid product that can benefit from a contour-fit, visibility package.

The vacuum-formed package also has interesting applications for food products. New on the market is an ingenious container that employs a shaped vinyl sheet to mold oleo, butter, jelly into fancy contours.

Polyethylene containers continued to make the most of their versatility of fabrication and application. One promising development saw double-wall polyethylene jars coming into greater prominence. A new one-piece molded polyethylene drum, in a range of 5- to 55-gal. sizes, is being tested for chemical shipments. The drums are inserted into steel shipping containers.

A new kind of flexible tube—a dipped seamless construction of vinyl plastic—is finding a special place as a single-use container for hard-to-contain products. It is initially being used for paint colors, Easter-egg dyes, and dental impression material. Durability, product visibility, and easy dispensing are among the advantages claimed for this novel tube.

There is a growing demand for convenience packages, such as those that permit processing and/or precooking of foods. The vinyl-coated, liquid-tight paper container, supplying this demand, set a fast pace last year. A housewife can put the package into the oven for preheating and it can then go directly to the table if desired.

Aluminum-foil pans and trays, and those of special foil-lined paperboard construction, have been finding new uses and users. A packager of frozen pies and croquettes has recently adopted new automatic equipment for closing a paperboard cover on a foil tray. The installation is a further step toward high-speed food packaging in foil trays.

The aerosol package offers perhaps the most dramatic example of the trend to provide built-in extras in container performance (McG-H Digest, Oct '53, p39; Feb '54, p22).

The first glass aerosol appeared last year. It employed a fiberboard safety sheath. More recently, an all-glass, bantam-sized, low-pressure aerosol for cologne was introduced in export trade.

Glass continues to offer an endless opportunity in the packaging of products that require an extra degree of protection and compatibility. New and beautiful container shapes and designs are coming into being. The entire U. S. liquor industry has been thrown into a new competitive situation through a sudden trend toward fancy decanters, rather than bottles, for even the lowest-priced whiskies.

Cartons and set-up boxes can meet just about any package demand and it is their versatility that continues to be news. The glueless, lock-tab tray and carton is prominent. These containers have been adopted for a host of products—produce, baked goods, frozen foods, toys, hardware, and the like—on a basis of both economy and efficiency.

Easy-opening tapes for corrugated cartons appeared last year. They provide an important convenience feature for the retailer, because otherwise it takes real effort to open a shipping carton and sometimes the contents are damaged in the process. Tear tapes can also divide the carton into a pallet-like tray.

If the packager decides that the merchandising aspects of packaging call for increased emphasis this year, he will find that developments in 1953 opened several new avenues of approach.

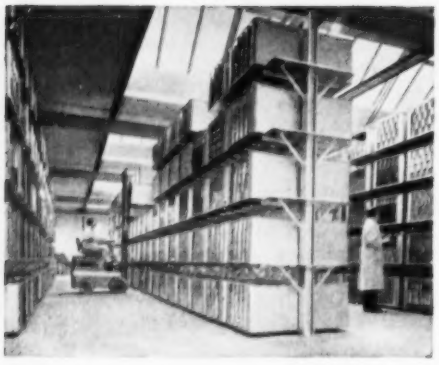
The Quaker Oats Co., for its cereals, introduced cartons letterpress-printed in luminescent inks and designed for display under black light. At least one packager has been experimenting with daylight-fluorescent inks newly developed for letterpress printing. The big success stories in this field are yet to come.—Mod Packaging, Jan, p85

Packaging Trends and Developments

Some new packaging trends and developments that provided wide interest in 1953 include:

- **Introduction of polyethylene-coated cellophane and expanding use of other coated flexible materials.**
- **Development of glass aerosols and the movement of aerosols generally into new product fields.**
- **Tear tapes for preformed bags and for shipping cases.**
- **Rapid growth of low-cost, vacuum-formed, contour-shaped plastic packaging.**
- **New types of molded polyethylene shipping containers.**
- **Adoption of oven-proof foil and fiber cartons for products subject to baking or reheating.**
- **The trend to fiberboard replacing wood shipping containers in the produce field.**
- **New usefulness for unit and strip packages, including applications to liquids.**
- **Increased attention to self-service design for drugs, toiletries, and rack-jobbed products.**
- **Trend to fine-screen package printing and a new method of pictorial printing on corrugated board.**
- **Introduction of the first black-light packages with a new type of luminescent ink.**
- **Significant advances in machinery, including the first air-control weigher and high-speed equipment to print, form, fill, and seal polyethylene film.**
- **Progress in mechanized handling of polyethylene bottles.**
- **Development of a completely flexible collapsible tube of vinyl.**
- **New uses for cellulose bands; automatic application.**
- **New dripless can; increased use of dope-seamed, tinless cans.**
- **New, functional applications for molded plastic packages.**
- **X-ray fill inspection for high-speed can lines.**
- **Wider application of VCI (volatile corrosion inhibitors).**

How Industry the World Over Combats Rising Costs



In DENMARK, for example

Clean, orderly warehousing of paints and lacquers by means of Clark trucks has accomplished big savings for S. Dyrup & Co. in Copenhagen. The operating rhythm is steady and uninterrupted; and accidents are practically unknown. Cleanliness is easy to maintain. Formerly, the storage of canned products was slow, difficult and costly.

In SOUTH AFRICA

Fast, low-cost handling is a necessity for South Africa's industry, to keep pace with its increasing volume and diversification. Moving this heavy concrete form, ordinarily difficult and exceedingly hazardous, is easy for a Clark 1000-lb. fork truck.

And in URUGUAY

Sharply on the alert for more efficient, more economical methods, Uruguayan industries have found that the more uses they can find for Clark fork trucks, the greater are their savings of time and money. Here you see a Clark truck handling cartons of labels in a printing plant.

It is easy and costs nothing to discover how your business, too, can enjoy substantial savings through planned use of Clark machines. Consult your nearby Clark distributor.

EXPORT DIVISION
CLARK EQUIPMENT COMPANY
Battle Creek 73, Michigan, U.S.A.

CLARK EQUIPMENT

Cat Reforming Boom Will Triple Capacity

This year will be a big one for catalytic reforming in U. S. refineries. The record building program, which will probably triple refinery reforming capacity, reflects an industry-wide acceptance of this process for upgrading straightrun naphthas to high-octane-gasoline blending stocks.

At the end of last year, 43 catforming units had a daily capacity of 200,000 bbl. Now on contract are 51 more units with a capacity of 435,000 bbl.

Platforming, licensed by Universal Oil Products Co., accounts for over half the total units and for 53% of total charge capacity. Seventeen Platforming units are operating or being built abroad.

Next in capacity is Hydroforming; fluid Hydroforming is now licensed jointly by M. W. Kellogg, Standard Oil (N. J.), and Standard Oil (Ind.).

Other processes include: Thermofor catalytic cracking—Socony-Vacuum Oil, Catforming—Atlantic Refining, Ultraforming—Standard Oil (Ind.), Houdriforming—Houdry Process Corp., Sinclair reforming—Sinclair Refining and Baker & Co., and Cycloversion—Phillips Petroleum. Another process, Hyperforming, has been developed by Union Oil Co. but no commercial units have been licensed.—Oil & Gas J, Dec 28, p46

Metalworking Abroad

▶ **West Germany**—Machinery manufacturers began 1954 with fewer export orders on hand than in either 1952 or 1953. Deliveries last year exceeded new orders by 20 to 25%.—Jan 30, p217

▶ **Switzerland**—Orders received by Swiss machinery manufacturers declined last year from the previous year. Export sales increased, except in important Latin American markets. Means of granting long-term export credits are being studied.—Jan 30, p217

▶ **Great Britain**—Last year was a record year for machine-tool exports; total was £23.2-million. The industry expects shipments this year to reach last year's figure.—Mach, Feb 6, p257

Wood as a Raw Material

Many countries that have few other natural resources have plenty of wood. Its wise use there and elsewhere can create a substantial chemical industry

WOOD AS A RAW MATERIAL should be utilized in each country according to its needs. Sweden, for example, is rich in timberlands, poor in oil and coal. So in Sweden, wood as the only chemical raw material available in large amounts becomes the basis for the country's chemical technology.

But even in countries rich in other natural resources, there is a growing realization of the folly of wasteful practices and the need for conserving the forests. In the U. S., this change is witnessed by increasing research and development in forest genetics, forest planting, and selective logging as wood becomes a raw material for efficient conversion not only into pulp but also into other products.

Increased wood utilization requires, as part of it, the use of wood wastes—tree tops, branches, bark, small dimensional lumber, broken wood, slabs, sawdust, and the wastes from pulping operations. Their chemical constituents can be converted into useful chemicals, but doing so requires a break with tradition, new thinking, more research.

A process long in use is the destructive distillation of wood to methanol, acetic acid, and charcoal. Development of other sources of methanol and acetic acid and less demand for charcoal have left only a few conventional wood distillation plants still operating.

But new technology may provide different chemicals from wood distillation. For example, the fluidizing process, as used by the petroleum industry, might permit the recovery from sawdust of intermediate products of pyrolysis in high yield. These, in turn, might be susceptibile to hydrogenation or catalytic oxidation to produce valuable by-products.

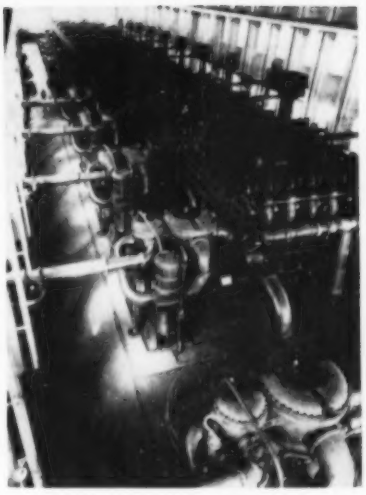
Wood saccharification (see p36) is another way open to chemical production. The wood molasses it yields can be converted by fermentation to ethyl alcohol or by hydrolysis to glucose.

While in most countries there is little pressure for the products of wood saccharification, development of even a small financial return from the lignin released during the process would quickly make the process competitive. One approach is to hydrogenate the lignin under conditions that would give a maximum yield of neutral oils. Possible yield would be 110 gal. of liquid fuel per ton of wood, compared with 65 gal. of liquid fuel per ton of coal by the Fischer-Tropsch process.

Other processes besides distillation and saccharification are being investigated. The U. S. Forest Products Laboratory is doing research on the hydrogenation of wood to produce pulp and hydrogenated liquor containing menthanol, propanol, propul cyclohexane derivative, and a resinous material. Hydrogenation of lignin seems to have advantages over the attempts to hydrogenate sawdust itself.

The wool-chemical industry, in competition with an alert synthetic-chemical industry, faces a major obstacle—the lack of complete knowledge on the physical and chemical constituents of wood. Not too much, for example, is known about lignin.

More research is needed throughout the whole industry. The chemical industry in the U. S. spends about 3½% of its net sales dollar for research; some companies spend up to 10%. Compare this with the wood industry: a few pulp and paper companies spend only 1 to 1½%. The majority spends considerably less. To meet such competition, the wood-chemical industry in any country must be willing to spend more on research and on market study to build and keep its market positions.—Paper Ind, Jan, p1115



World's Largest

Broken Hill, New South Wales, Australia, can boast of having the world's largest oil-burning diesel plant. It meets the demand of the big silver, lead and zinc mines with an installed capacity of 52,750 hp. A new plant just added 23,400 hp. of this total and can be enlarged to add more engines. Twelve diesel engines drive alternators to generate power, and ten engines drive air compressors. The station burns 5-million gal. of fuel oil a year to generate 75-million kw.-hr. —Power, Jan, p79

Carbide Hollow-Ground

Clamp-type toolholders, as on multi-tool automatics, tilt carbide inserts forward at an angle of about 7° to provide side and front clearance without grinding. This tilt results in negative rake when insert ends are ground flat.

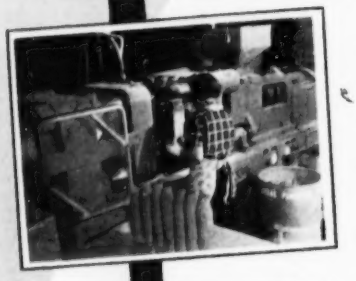
Negative rake is undesirable for many operations. So the ends of carbide inserts are hollow-ground at Caterpillar Tractor Co.'s Peoria plant to change the rake to zero or positive. When surface finish is not important, hollow-grinding can increase the cutting rate by 25 to 30%. As hollow grinding costs more than flat finishing, inserts are hollow-ground only when a cost analysis calls for it.

Carbide inserts are hollow-ground with ¼-in.-face diamond wheels from 1- to 6-in. OD. Wheel diameter depends on the insert size and the radius needed to give the desired rake angle. Grinding is done on a Brown & Sharpe universal grinder under a flood of coolant.—Am Mach, Jan 4, p89

"For round-the-clock molding
OUR NINE W-S PRESSES
ARE PERFECT PERFORMERS"

BRIDGEPORT MOULDED PRODUCTS INC.

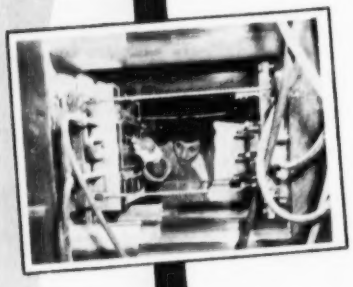
Foremen and operators at Bridgeport Moulded Products, Inc., one of the largest and busiest contract injection molders in New England have these high praises for Watson-Stillman Injection Molding Machines:



"Maintenance in W-S presses is lower than on other machines"

"Our W-S machines are rugged. They stand the gaff of 24-hour-a-day production, showing lot less wear than other machines"

"Changing dies is easier"

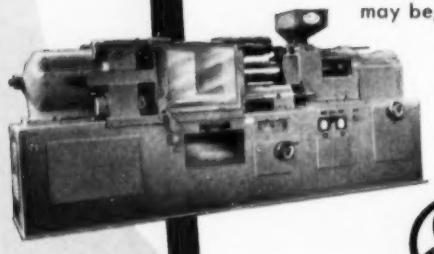


"Heating units are simpler to clean out—easier to change over to new material"

"Greater clamping pressure is a feature for producing better molded parts"

Nine W-S Injection Molding Machines, varying in capacities from 12 to 60 ounce models—hour after hour, around the clock turn out thousands of difficult molded parts for this leading manufacturer.

Whatever your injection molding need may be, there is a W-S Machine from 12 to 300 ounce capacity, that will meet it. Send for our latest catalog.



W-S HYDRAULIC

EXPORT DEPARTMENT
THE WATSON-STILLMAN COMPANY
DIVISION OF H. K. PORTER COMPANY, INC.
150 Aldene Rd., Roselle, New Jersey

2844A

Look for these Trends in Machine-Tool Design

New trends in machine tools were emphasized recently by F. S. Blackall, Jr., President of the American Society of Mechanical Engineers. He predicts that:

1. **Automatic loading** and ease of chip removal will get much more attention. The latter may involve new design concepts, such as mounting lathe ways at an angle to allow chips to fall out of the machine.

2. **Automatic gaging,** both on the machine and as separate gages, will effect high cost savings.

3. **Special tools** and accessories will broaden their use. An example is the horizontal boring machine that accessories have made into a highly versatile unit for job-lot production. Fixtures will be designed so that work can be mounted in them and the whole assembly moved from machine to machine.

4. **Many production-type** machine tools will be built of "packaged units." When a part goes bad, replacing by a duplicate packaged unit will simplify maintenance. Packaged units will allow machine-tool builders to meet the growing demand for special-purpose machines without sacrificing the economies of standardized production.

5. **Steel ways,** hardened and ground, will replace hand-scraped cast-iron ways. Steel ways last longer, are easier to repair, and should be less expensive in the long run.

6. **Better coolants** will increase machining speeds.—Am Mach, Dec 21, p109

In Next Month's Issue . . .

. . . don't miss the article on new-product research and development. It's a vitally important subject, especially under today's conditions when competition is stiffer and selling harder. The right new product can open new markets for you or expand old ones. You will find the answers to what makes the right product and how to go about finding it in next month's Digest.

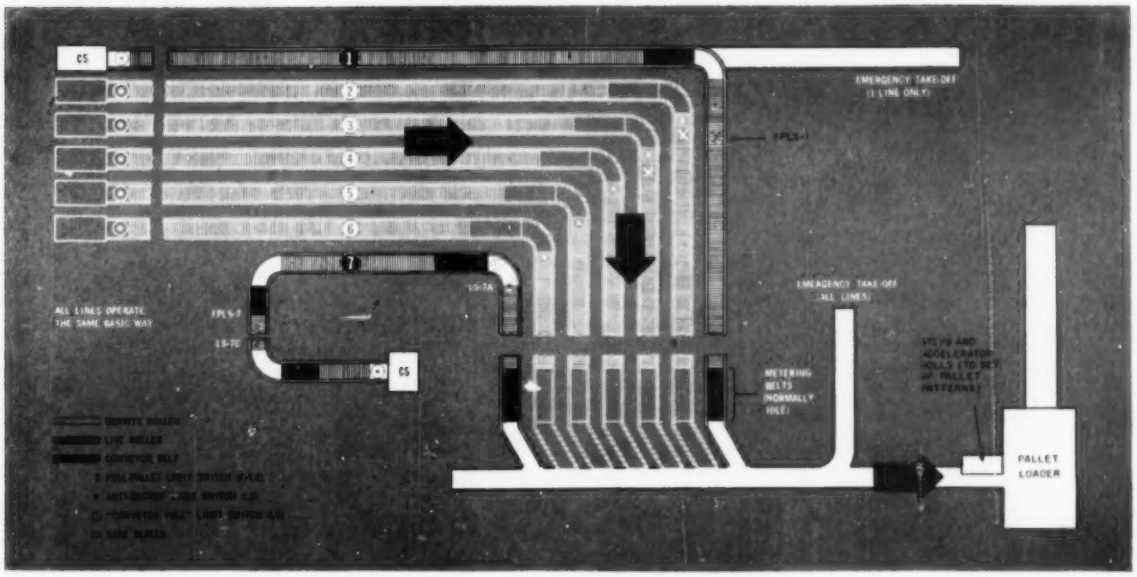


Diagram of a modern detergent plant shows how conveyor and pallet-loader . . .

System Cuts Handling 80%

A highly complicated packaging job gets the automation treatment and becomes a relatively simple operation. For your plant: some new ideas

To PALLETIZE CASES of finished product by hand and then transport loaded pallets to shipping can be a costly, fatiguing business, especially if—as at the Colgate-Palmolive Co., Kansas City, plant—you have four products (household detergents) and four-different size cases.

Colgate solved its problem by "going automatic." It installed a pallet loader and a conveyor system to feed it (see diagram). The pallet-loader's capacity is 30 cases a minute. At full production, the labor saving is 88%; at expected lowest production rate, 80%. In labor savings alone, the unit will pay for itself in 4½ years.

The starting point of the system is at the case sealers at the end of the production lines. These are automatic units that place the boxes of detergent into cases. They are indicated by a "CS" on the diagram. From the case sealers, the cases proceed along a combination of gravity-roller, live-roller and belt conveyors to metering belts (center left of diagram).

Along the conveyors are a series of limit switches, indicated by white dots. These switches are "anti-backup" switches, designed to prevent jamming of cases. They are placed on the far side of all curves.

Suppose, for example, that line 7 is filled all the way from the metering belt to limit switch 7A (LS-7A on the diagram). Further cases arriving would be halted on the curve adjacent to the switch. That could cause a jam-up. When any case rests on LS-7A for 7 sec. or more, the limit switch is actuated and stops the motor driving the belt conveyor on the other side of the curve. No more cases can enter the curve, and jamming is eliminated. The same switch also stops the section of live-roller conveyor on which it is located.

Adjacent to each case sealer is another limit switch, indicated by a dot in a circle. These switches are placed there to prevent the production line from jamming. Should cases accumulate all the way back to this switch, an alarm is sounded both in the department feeding the line and at the pallet loader. Cases are removed from the line, and the trouble is located and remedied.

By the process just described, the cases arrive at the metering belts, which normally are not running. To illustrate this, it will be easiest to use line 1. The cases accumulate until finally one stops on the "full-pallet" limit switch (FPLS 1). This switch, too, is a time-delay limit switch and is actuated only by a case resting on it for 7 sec. or more, not by merely passing over it. Once this switch is actuated, the line is "ready to go."

A full-pallet limit switch is on each of the seven lines. All are located at such a distance from the metering belt to provide room

How the Pallet Loader Works

When the metering belt to a given line is actuated, the selector also automatically sets up the pallet loader to handle the size case from that line. "Setting up the pallet loader" means actuating one of four "control cartridges." Although there are seven lines, there are only four different case sizes—24's (24 packages to a case), 10's, 60's, and 48's.

Each case size is set up differently on a standard 40x48-in. pallet; there is a different number of cases per pallet, and two different pallet patterns (for interlocking alternate layers) for each size case. As an illustration of the cycle, controlled by the control cartridges, let us take the most common example—the palletizing of 24 packages.

As the first carton arrives, it moves right across the pallet loader. So does the second carton until it strikes the first. Then these two cartons are snugged together by the closer ram and pushed forward onto the stripper plate by another ram.

The fourth and fifth cases move straight into the loader, but the sixth carton is rotated 90° by the stops and accelerator rolls. These three are snugged and rammed onto the stripper plate pushing the others ahead of them.

Finally cases 8, 9, and 10 move in (10 is rotated 90°), are snugged, and rammed. The control cartridge causes the stripper plate to slide out from under the now-complete layer (the layer is blocked in position). The layer, no longer supported by the plate, falls onto the pallet. The cartridge then actuates the motor, which lowers the pallet a distance equal to the height of the cases, the plate moves back into position, and almost without interruption the second layer—a different (opposite hand) pattern this time in order to provide interlocking for a steady load—begins to form.

Finally, when three layers have been placed on the pallet, completing the pallet load, the finished pallet is whisked out of the unit, and an empty pallet is elevated to receive the next load.

---

for a full pallet load of cases, plus five extras, between the metering belt and the switch.

Suppose, then, that line 6 has just been fed to the pallet loader. A circuit in the pallet loader (called the sequence selector) then automatically "inspects" line 7 to see if the full-pallet limit switch on it is actuated. Suppose it is not.

The pallet loader then inspects line 1. Assume that the full-pallet limit switch on this line is actuated. Two things happen: (1) the metering belt on line 1 is actuated and (2) the pallet loader sets itself up to palletize the particular size case on this line.

When the metering belt starts, the first cases in line move via the main live-roller conveyor to the pallet loader. As the cases move off the first anti-backup switch, the switch is de-actuated, allowing the belt conveyor on the other side of the curve to start. This section cascades right back to the case sealer; while the metering belt on any line is running, so are all power sections of that line.

Two photoelectric cells are beamed across the discharge end of each metering belt. One counts the cartons as they cross the metering belt and stops the belt when a pallet load has passed. The other inspects the cases to make sure the top flaps are closed (if not, the pallet loader might be jammed). If any flaps are up, a bell rings, alerting the operator who tapes them shut.

When a full pallet load (30 cases from line 1) has been delivered, the sequence selector on the pallet loader next inspects line 2 to see if the full-pallet limit switch on that line is actuated. If so, the metering belt on line 2 starts feeding cases to the loader. If not, the sequence selector inspects the full-pallet limit switch on line 3. And so on.—Factory, Feb, p98

Tagging Steel Melts

Research at Knolls Atomic Power Laboratory, Schenectady, N. Y., indicates that radioisotopes offer several advantages over chemical analysis to trace steel melts of critical composition.

Adding a tracer to the melt would permit a 5-min. check to replace the usual 15 man-hr. of chemical analysis. Laboratory space needed would be negligible.

One radioisotope that would work well is nuclide tantalum-182. Activity and half life satisfy requirements that researchers set up, although the activity is considerably greater than the maximum allowed by the Atomic Energy Commission for contaminated scrap steel.—Nucleonics, Jan, p16

Outdoor Plants . . .

. . . have been credited with large savings in power-plant construction. Here are new cost figures

TO COMBAT RISING COSTS, central-station designers have turned to reduction of housing costs by construction of outdoor plants. But all has not been harmony within the industry.

Proponents of indoor housing point out that the functions of plant housing are to protect personnel, shield equipment, and give the plant a pleasing appearance. Owners of outdoor plants report, however, that station operators and workers prefer the outdoor arrangement. On protecting equipment, they concede that increased casing costs of apparatus reduce the net saving. As for appearance, outdoor proponents claim that functional designing and grouping of plant elements, together with selection of right materials, can give a pleasing appearance.

Capital cost reductions can only be estimated; the savings depend on equipment arrangements. This is shown by figures released by Stone & Webster Engrg. Corp. on two power stations it built. Station No. 1 was designed and built as a totally enclosed plant. The 200,000-kw. plant is coal fired and does not have completely centralized control.

Station No. 2, on the other hand, was built as an outdoor plant with 250,000-kw. capacity. It is fired by oil and gas, and has completely centralized control. Increment costs of enclosing each plant are:

Station	No. 1	No. 2
Outdoor cost, $-million	22.5	26.2
Minimum enclosure, add	0.9%	0.95%
Mild-clime enclosure, add	1.8%	2.15%
Cold-clime enclosure, add	2.7%	2.7%

Additional cost figures, released by the Long Island Lighting Co., show that capital saving for four outdoor plants were estimated at over $4 per rated kilowatt of capacity.—Power, Feb, p105

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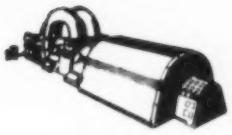

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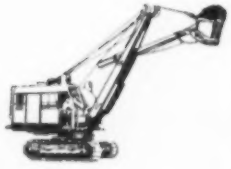

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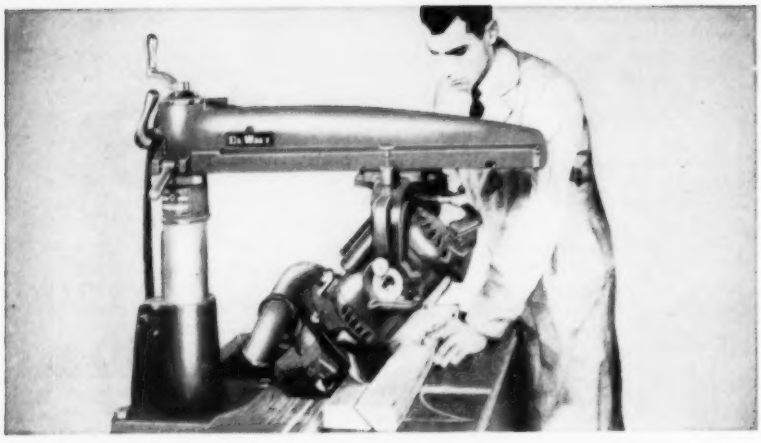

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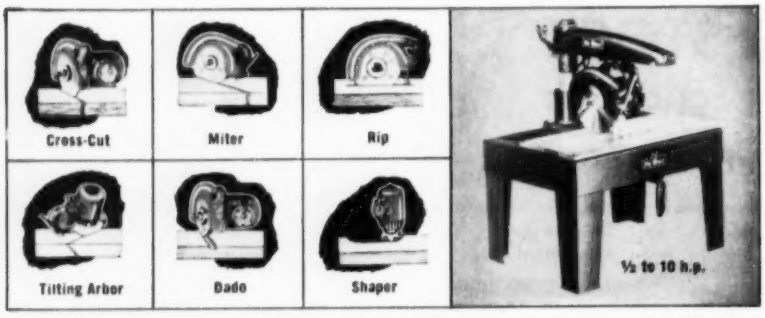

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One-Use Milk Cartons: A New Pouring Spout

Something new in disposable waxed-paper milk containers is making its appearance in the dairy field. It is a carton having a "built-in" pitcher-style pouring spout that is easy to open and easy to reclose.

The new package is made up from a pre-glued flat blank and set up and wax-coated automatically at the dairy prior to filling and sealing. Bottom and side seams are sealed by a vinyl-base adhesive highly resistant to lactic-acid absorption, resulting in a tight, permanent seal. The hot-waxing operation sterilizes the container and seals the surface of the paperboard against leakage.

In opening the carton, the first step consists of gripping the side flanges of the gable top. The "wings", which form the pouring spout, are then spread open, breaking the perforated top seal of the package. Flaps are folded all the way back by the thumbs, and finally, forward pressure exerted by the forefingers causes the tucked-in folds to reverse themselves and open up into a roomy, convenient, sanitary pouring spout.

The equipment for forming, filling, and closing the packages is made by the Pure-Pak Div., Ex-Cell-O Corp. At present, Hawthorn-Mellody Farms Dairy, Chicago, are using the containers.—Mod Packaging, Dec, p98

Rock Slab Is Anchored To Sound Canyon Wall

A huge rock slab—180 x 120 x 19 ft.—was anchored to the canyon wall above the Nevada valve house at Hoover (Boulder) Dam. There was no immediate danger that the slab might drop off. Engineers simply decided to have it anchored as a precautionary measure.

To anchor the slab to the wall, some 349 holes for 2-in. anchor bars were drilled through the rock slab and valve-house wall into the rock abutment. Bars had 3-in.-long sleeves welded to their ends for improved anchorage. Depth of each hole varied according to the thickness of the slab, but had to be at

least 13 ft. from the seam into the abutment. Holes were 3½ in. in dia.

The portion of the anchor bar that lies between the rock seam and rock surface was wrapped with paper to prevent bonding of the grout to the bar. One-third of the hole was filled with grout, and the anchor bar forced into the hole. Grouting was then completed.

At least 28 days after grouting, the bars were loaded to a tension of 63,000 lb. and the nut on each bar was tightened against the bearing plate using a torque of 2,000 in.-lb.—Eng News Rec, Dec 17, p25

Crucible Heat Control

In the production of starters for ignitrons, boron and graphite are sintered in a crucible at about 1700° C. Temperature and time supervision are essential to quality control. This is accomplished with an automatic furnace control.

Heat radiation from the crucible container is focused onto the cathode of a gas phototube connected to the grid control of a pentode tube. Corrections in temperature variation are made by adjusting the phototube aperture disk and the sensitivity controls.

For sintering at 1700° C., controls should be set so a thyratron tube fires at 1600° C., to avoid temperature overshooting. When the temperature reaches 1708° C., a second thyratron fires, thereby decreasing crucible power so the temperature starts dropping.—Electronics, Feb, p149

Low-Cost Safety Glass

Food plants have a vital interest in glass that does not shatter. But shatter-proof window panes can be costly, so General Foods Corp. investigated other means of providing the safety required.

Tests showed that a plastic material, Liquid Envelope Permanent Clear No. D2089 made by Better Finishes & Coating Co., was highly satisfactory as a shatter retardant. It actually held broken pieces together, except when the glass was struck with a severe blow.

Cost of applying two coats to a 14 x 20-in. pane is 3½¢. A wire-bound pane of the same size costs about $1.30.—Food Eng, Feb, p11

Magnetic Memory . . .

. . . is the heart of a new electronic system of keeping inventory records. First installation made keeps records fast and efficiently in a mail order house

LATEST STEP in commercial application of automatic information-processing systems was the installation of Speed Tally System at a mail order house. The new system was developed by Remington Rand Inc. expressly for rapid tallying and keeping of inventory records.

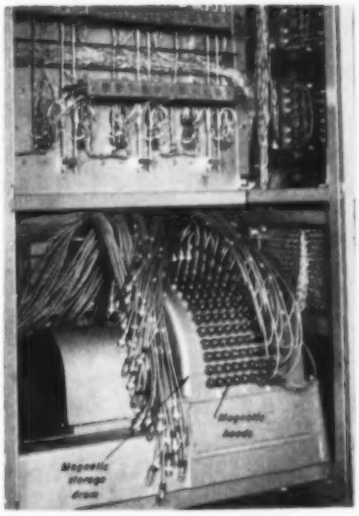
Speed Tally mechanizes the tally operation by searching for the appropriate item record, totalling, and recording the tally. It can keep three categories of tallies for each of 13,000 items with complete totals for each of the items automatically printed out of the system in 3 hr. The installed system, for catalog order processing, has an input of 75,000 order-lines per day with ten order clerks.

The mechanism consists essentially of keyboard-indicator sets, magnetic memory-storage drum, control tape unit, and output printer. Information as to quantity and item number is entered into the system from a keyboard-indicator unit. As soon as the last digit of the five-digit item number has been entered, the memory drum connects itself with the controlling keyboard and stores the quantity and item number in input registers.

The registers locate the specified area of the drum, read the quantity previously there into an arithmetic register, add or subtract the quantity from the keyboard, and return the adjusted total to the proper place on the drum. Total time for the entire operation is less than 0.4 sec.

Information is stored on the drum in 130 tracks of 3,600 bits each. It is recorded or read by means of 130 magnetic heads, one for each track.

The drum itself is a rotating cylinder traveling at 1,590 in. per sec. It is divided into five sections in which these operations occur during each drum rotation: (1) read-out old quantity from drum, (2) and (3) add or subtract, (4) idle, (5) new total entered on controlling keyboard, and (6) new quantity entered on drum at position from which it was read-out, that is, operations (1) and (6) are carried out at the first station.

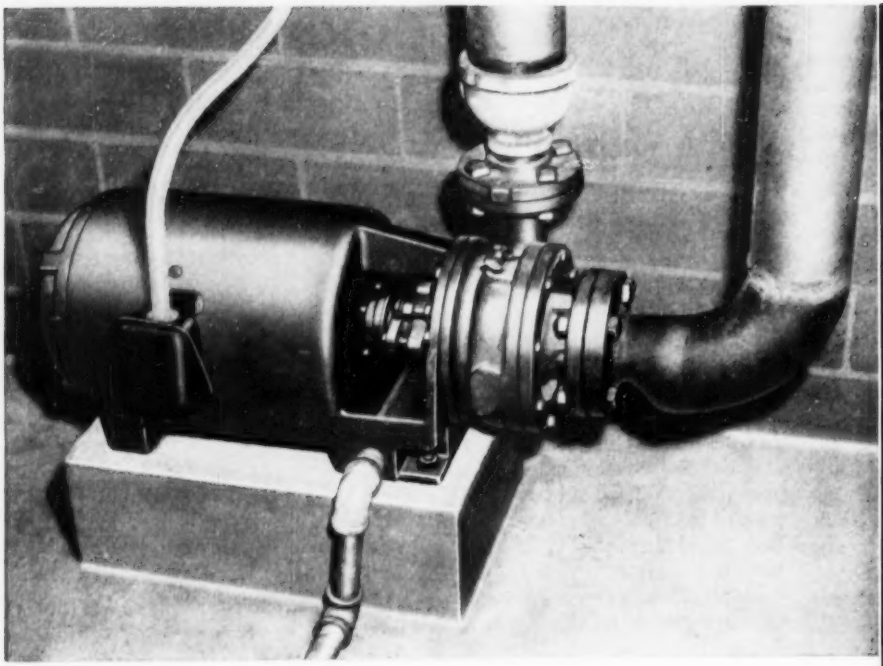


MEMORY DRUM stores information in 130 tracks and can keep a total tally of 39,000 items in three categories

When a tally record is wanted, a punched tape is inserted in the tape control unit. Totals are then printed by the output printer along with the identifying item number.

The tape control unit both prepares and reads the coded tape that schedules the item numbers and category for which tally totals are desired. Tape decoding is translated into electrical signals that give the item addresses on the magnetic drum for subsequent quantity reading.

Experience available to date on the first installation indicates that this new system will have ready application in many industries. Any large firm that carries a large inventory and is therefore faced with a major problem in keeping inventory records up to date can well consider doing the job electronically.—Prod Eng, Feb, p154



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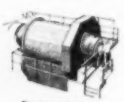
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TECHNICAL SHORTS

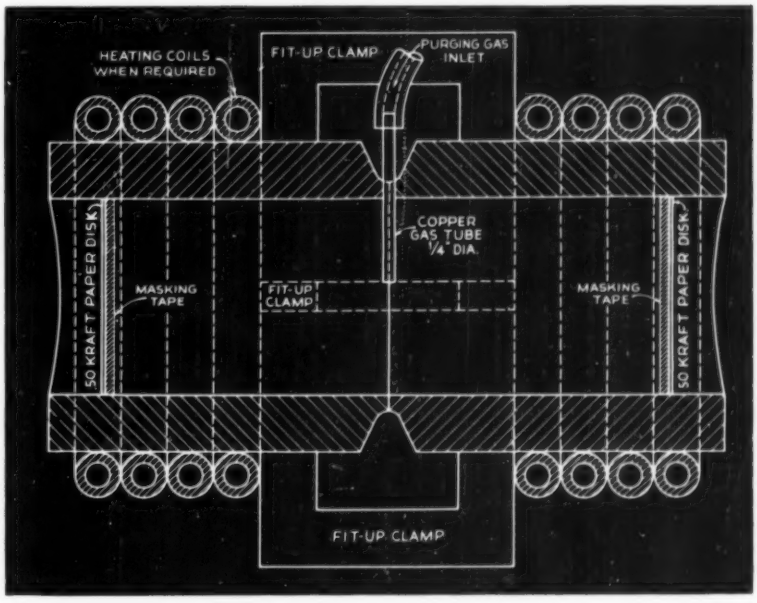
Cleans Stop Motions—Here's a kink that will save you rejects and damaged machines in your knitting mill. It will help remove lint from hard-to-get-at places. Wrap friction tape around the end of an old yarn stick. The yarn hook on the stick should be broken off. That way you can get into corners to pick off lint that has been accumulated and cannot be removed with an air hose.—Textile World, Jan, p162

Cold Aluminizer—Kolmetal, a mixture of finely powered aluminum in a plastic base, has been developed by Enjay Maintenance Engineers, Rutherford, N. J., to coat surfaces with aluminum. No heat is needed. Two applications give a coated surface that can be polished, ground, rolled, or bent.—Chem Eng, Feb, p154

Polyethylene Plant—New Allied Chemical & Dye plant at Tonawanda, N. Y., will make high-melting-point polyethylene wax from ethylene derived from fuel oil. It is the first example of commercial synthesis of ethylene from a petroleum or natural-gas fraction heavier than gasoline.—Oil & Gas J, Jan 11, p64

Better Magnesium Alloy—Dominion Magnesium Ltd. reports that the addition of 2 to 3% of thorium improves magnesium casting alloys by increasing ductility and creep resistance. Properties are uniform throughout the casting.—Prod Eng, Feb, p5

Silicone in Cosmetics—Silicone products may be blended with common cosmetic products, thus providing a sharp increase in water repellency and protective action against detergents. So says General Electric Co.'s Silicone Products Dept. Potential applications include lipstick, hair dressings, cold creams, and hand creams.—Mod Plastics, Feb, p228



Pipe Welding Process Saves Time and Money

New process of shielded-arc welding of pressure piping has been developed by Stone & Webster Engrg. Co. Joints are welded faster because no metallic backing rings are needed. Inert gas is used as the backing. Paper disks retain the gas. After preheating, gas is bled into the pipe and the first bead is made with no filler metal added. Subsequent beads are made with filler rod. Paper disks and tape burn out during the next step, the stress-relieving of the pipe.—Pet Proc, Feb, p277

Business Airplanes—Many U. S. companies have found that it pays to own private airplanes because of the speed, comfort, and convenience they offer. General Motors has 25 airplanes. About 700 firms not in the aviation business operate over 1,200 multi-engine airplanes. Single-engine airplanes used in business number in the thousands.—Iron Age, Jan 21, p35

Carbonless Copying—National Cash Register Co. has developed a "carbonless" copy paper, called NCR paper. Coating the underside of the top sheet with a colorless liquid and the upperside of the second sheet with a clay-like material gives the copying effect in the familiar blue.—Chem Wk, Feb 6, p54

Paper for Burma—Under its first government-sponsored plan for foreign capital participation, Burma expects to have a pulp and paper plant in operation soon in Rangoon. Bamboo will be the raw material. U. S. capital is expected to help finance the plant.—Paper Ind, Jan, p1104

Rainmaker Succeeds—Last year Dallas, Tex., hired a professional rainmaker to seed clouds with silver iodide crystals in the watershed areas of its reservoirs. When it proved that rainfall increased the city's water supply 363% during the first 6 months of the year, while during the same period the reserves of nearby cities showed little change, Dallas continued the rainmaker's services for 1954.—Eng News-Rec, Jan 21, p46

Raising Employee Efficiency and Morale Through . . .

A Job Enlargement Program

A utility company discovers that the values of mechanization are overrated, that the individual can count for more than the machine in raising output

IN THE MECCA where Henry Ford created the mass-production technique, where "automation" is the magic word of the day, a large power company has discovered that specialization, monotony, and tedium—by-products of the mass technique—can defeat many of the advantages of assembly-line methods.

In a reevaluation of the methods of its billing department begun about 3 years ago, the Detroit Edison Co. found that its mass production and mechanization methods had not produced maximum efficiency. The evil: work simplification. The solution: an idea that J. Douglas Elliot, customers-billing supervisor, calls "job enlargement."

Job enlargement has three objectives: (1) reduce job monotony, (2) utilize employees' intellectual capabilities to a greater extent, and (3) decrease specialization where it produces duplication and increases costs.

The customers-billing department of Detroit Edison serves more than a million customers. It handles more than 30,000 accounts each day. The billing system functions much as an automobile assembly line would, with billing records moving from station to station and taking on billing data until the account is current.

Many of the individual jobs, such as posting single entries and tabulating, were terribly routine. And Detroit Edison found that the boring routine created high fatigue and low morale; quality and quantity of work were low and absenteeism was high.

Edison began its experiments against worker fatigue with such common improvements as the playing of music, more frequent rest periods, job rotations. The result was merely to turn the worker loose on two tedious jobs rather than one.

So the company decided to experiment in shifting job duties. The program was put into effect at the supervisory, worker and worker group levels. Here are the results on two entire work groups on which the new scheme was put into effect.

The first group maintained a file of 1.7-million tabulating cards. Employees filed the cards, assigned account numbers, and performed other routine tasks. The second group punched and checked the cards from customer service orders.

These two groups were divided into two new groups of 17 employees each. The file was divided in half and each group then became responsible for all the duties previously performed by both former groups. Two supervisors were now required (before there was only one), but each supervisor soon discovered after the change that both old groups had been duplicating each other, particularly in checking each other's work.

As the work covered a broader range, the responsibilities of each supervisor were immediately enlarged. There were nine clerical jobs in each group. These came under immediate study and were reduced to three.

Prior to the change, one group was steadily behind in its schedule. Overtime was the rule and the company planned to hire more people. With the splitting of the two groups, duplications in checking one another's work were elim-

inated and within a week each group was on schedule.

Here is how job enlargement operated at the worker level. An operator ran off statements on a tabulating machine. Additional information was then typed on the statement cards by three typists employed specifically for that purpose. However, time was often lost by the operator and typists in waiting for each other's work.

The problem was solved by transferring the operator to other machines and hiring a fourth typist. The girls then divided their time between the tabulator and their typewriters. In this way the work output was considerably increased and the typists were given greater responsibilities.

At the supervisory level, job enlargement followed a similar pattern. Supervisors no longer merely follow instruction from supervisors. They are now given greater latitude in preparing budgets, hiring and firing, recommending raises, and shifting workers from one job to another to expedite work.

As a result, supervisors are now more cost-conscious. They have a chance to judge job applicants and can make changes in operating procedure as long as they do not run counter to company policy.

The key to job enlargement is the individual rather than the machine. By concentrating on the individual more than the machine, Detroit Edison has reduced costs and increased productivity through such things as increased worker interest, greater flexibility of workers, elimination of needless operation. The company is no longer inclined to assume that mass-production methods mean reduced costs.

A study of 122 electric utilities revealed that job enlargement is definitely the better approach. It showed that operating costs in companies that have highly specialized billing and banking systems are 40% higher than in those companies that have the least amount of specialization.

A further study within Detroit Edison itself was equally enlightening. Work absences in 78 work groups showed that the absentee rate in classifications that included highly repetitive jobs was

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20% higher than in groups whose work was only moderately repetitive or entirely non-repetitive.

By giving workers a chance to break away from the routine of one function, by broadening responsibilities so that the worker must use more initiative, and by minimizing over-simplification, Detroit Edison increased worker satisfaction, increased productivity, and still realized cost reduction.—Elec World, Jan 4, p16

Wood Challenges Corn

Competitive sugar from wood waste took one step closer to commercial use with completion of cost studies of the revamped Rheinan wood saccharification process. It consists of hydrolysis with concentrated hydrochloric acid at low temperatures and pressures.

The revamped process produces dextrose to compete with that made from corn. Chipped wood waste is "prehydrolyzed" by boiling with 1% acid at 265° F. The yield of hemicellulose is 22% on a dry-wood basis.

Hemicellulose is centrifuged, dried, and converted, in the main hydrolysis tower, to dextrose by countercurrent 41% acid. Pure acid separates the resulting sugar solution from the lignin, which is removed from the tower by water and air and used to make phenol-formaldehyde resins.

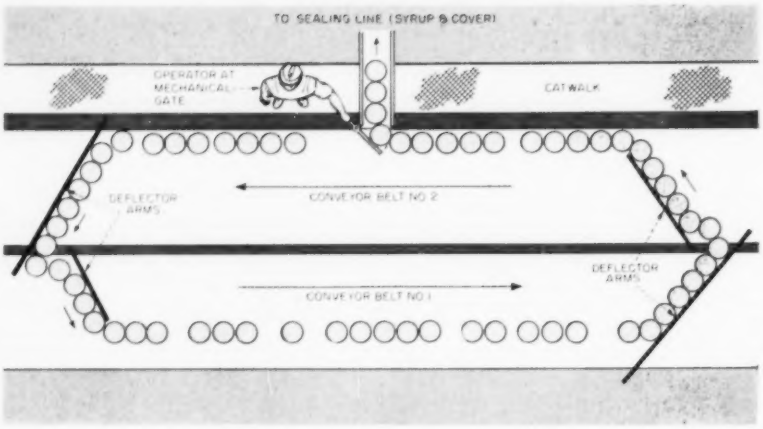
A vacuum evaporator separates the sugar solution and acid. A post hydrolysis converts di- and trisaccharides in the sugar solution to dextrose.—Chem Eng, Feb, p138

Exact Color Matching Achieved with Few Rejects

Beam dyeing of cotton warp yarns at Avondale Mills is an efficient, simple and accurate process. Multiple-kier Smith-Drum machines are the only pieces of equipment in the dyehouse. No extractor or dryers are used. And less than 1% of seconds because of dyeing defects is routine performance.

The fabrics require from 1 to 11 colors, at least eight beams per style. By using multiple-kier machines, the dyer is able to reduce the variation in shade that would result from individual-beam dyeing. Two-, three-, and four-kier units are in operation. An empty kier can be blocked off. Any combination can be worked out to reduce the number of dye lots per warp or style.

Each operator is responsible for weighing his own chemicals, preparing the lots, and cycling the dyeing by hand. Pigment and reduced vat-dyeing procedures are typed on a card for the operator to follow. Specific information is filled in by the dyer as required.—Textile World, Feb, p120



Shuttling Belts Prevent Jam on Can Line

Hawaiian Pineapple Co., Hawaii, has designed a belt accumulator to regulate the flow of cans to syrup and closing machines. The accumulator—two 80-ft.-long, rubber-covered belts moving in opposite directions—shuttles cans back and forth until machines are ready for them. As a can nears the end of one belt, a deflector arm switches it to the other belt. Cans keep shuttling until the operator trips a mechanism to send them down a gravity slide for further processing.—Factory, Feb, p108

New Casting Technique

New short-cycle investment casting process offers all the advantages of the lost-wax process plus relatively high production. The process, developed by W. H. Anderson Co., substitutes plastic for wax to simplify handling, improve accuracy, and reduce the time needed to tree small parts or mount the patterns on a button.

The time required to dry the investment material is only 4 hr., compared to 12 hr. for wax. Thus, the whole cycle is less than 6 hr.

A special heat-resisting precoating solution speeds up the casting cycle. Its ability to withstand heat shock allows drying furnaces to be brought up rapidly to casting temperature without causing cracking, rupture, or distortion of the cavity.—Iron Age, Jan 28, p115

Masonry Cavity Walls Built 19 Stories High

The U. S. Veterans Administration hospital nearing completion in New York City will be the tallest building in the world to be enclosed with masonry cavity walls. The building is 19 stories high.

Two vertical planes, or wythes, of masonry are separated by an air space. This construction minimizes rain penetration and furnishes better heat insulation than a solid wall of the same thickness.

A novel device prevented mortar from dropping into the air space during construction. As the wall progressed, the two wythes were tied together with ¼-in. bronze anchors, 24 in. on centers horizontally and at every fourth brick course vertically.

When the anchors were set in place, a length of metal-edged 2 x 2 lumber was placed on top of them, to catch mortar drippings. This trough was pulled up and emptied after every fourth course, just before a new row of anchors was inserted.—Eng News-Rec, Feb 4, p40

1-8 cyl.

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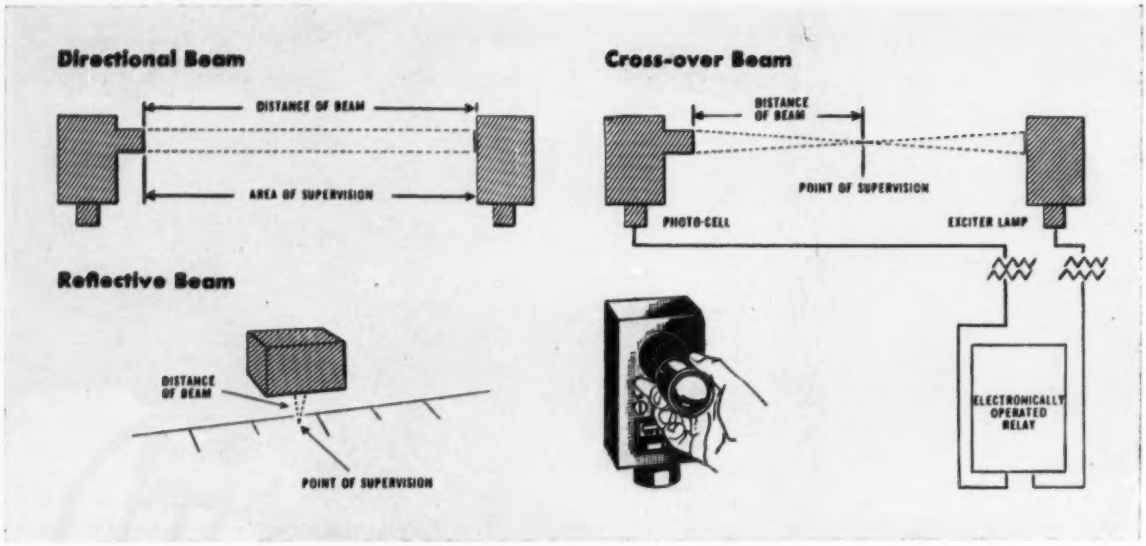


Industrial Applications for . . .

Photoelectric Control Systems

Costs can be reduced and safety factors increased with the use of photoelectric control systems in your business. Packaged units minimize installation and maintenance, open up new fields

PHOTOELECTRIC UNITS, applied properly, can result in countless savings, short cuts, and safety measures in industrial, commercial, and domestic operations. While the principle of the "electric eye" has been known for some time, it is only recently that the development of small packaged units has opened up unlimited possibilities in the field.

Operation of the packaged unit is based on the projection of light to a photocell receiver. Whenever the light beam is interrupted, electronically-operated relays activate switches or controls. The precision-engineered units can be installed by the average electrician or plant maintenance man.

Exciter lamps provide light in the form of a broad directional beam, a pin-point cross-over beam, (obtained through the use of lenses), or a beam reflected by mirrors. Depending on the tasks to be performed and operating conditions to be encountered, selection of the exciter lamp and photocell is governed by several variables:

1. Rate of speed at which the object is travelling.
2. Size and shape of the object supervised.
3. Physical characteristics of object, that is, transparency, type of material.
4. Distance between exciter lamp and photocell.
5. Method of feed of object, such as by conveyor, gravity, free falling.
6. Unwanted or extraneous light that could cause variables in operation.

The directional beam travels directly from the exciter lamp to the photocell unit, supervising an area. This type of beam is particularly useful when the exact point of supervision over process or objects fluctuates within limits.

For controlling small objects, the cross-over beam is most efficient. Supervision is provided at a fixed point, the beam concentration being obtained by a lense incorported in the exciter-lamp assembly.

The reflective beam solves many problems of supervising objects moving across flat opaque surfaces that do not permit penetration of a light beam. Applications might include: (a) supervision of cutting, stamping, or folding of nontransparent material moving along a conveyor and (b) regulation of liquid level in an oil tank.

Photoelectric units are available in a wide variety of combinations. Cases are designed for indoor and outdoor service or with interchangeable optical systems permitting the switching of lenses in the event of production changes. Relays can be adjusted so they will operate on complete or partial

changes of light. Another desirable feature that may be included is a time delay unit, which may be adjusted from zero to 45 sec. for delayed action control.

While a few possible uses for photocell systems have already been cited in connection with the description of basic types of light beams, there are countless other applications as well. For example:

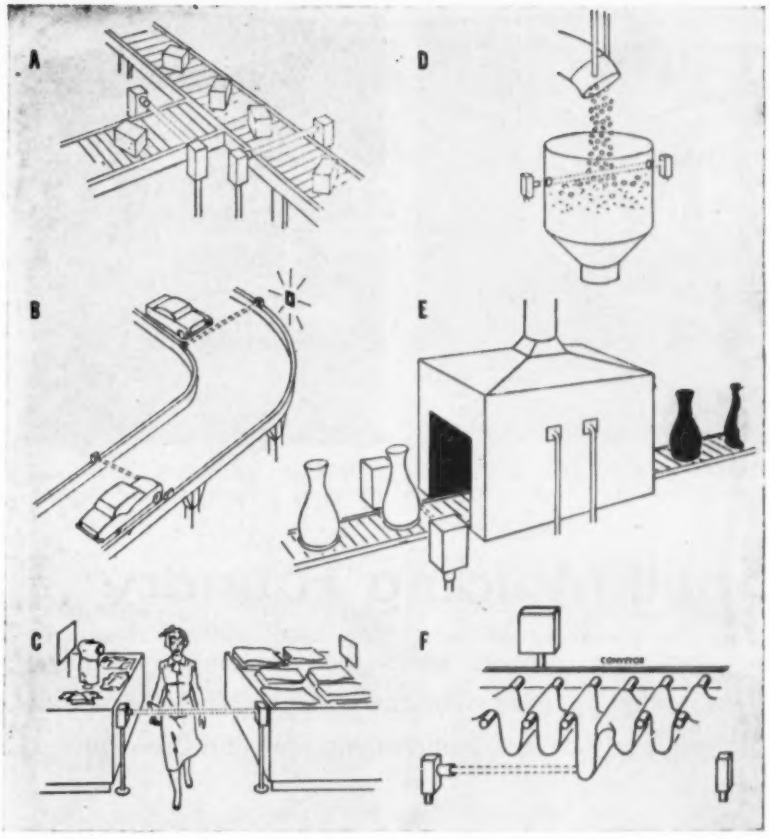
1. **Dual photocell sets** in staggered positions along either side of a moving sheet could shift the sheet to the right or left, keeping it centered accurately within minute limits.

2. **In shearing materials** or parts to a certain length, photocell units can serve as limit switches, activating the cutter automatically only when desired lengths are reached.

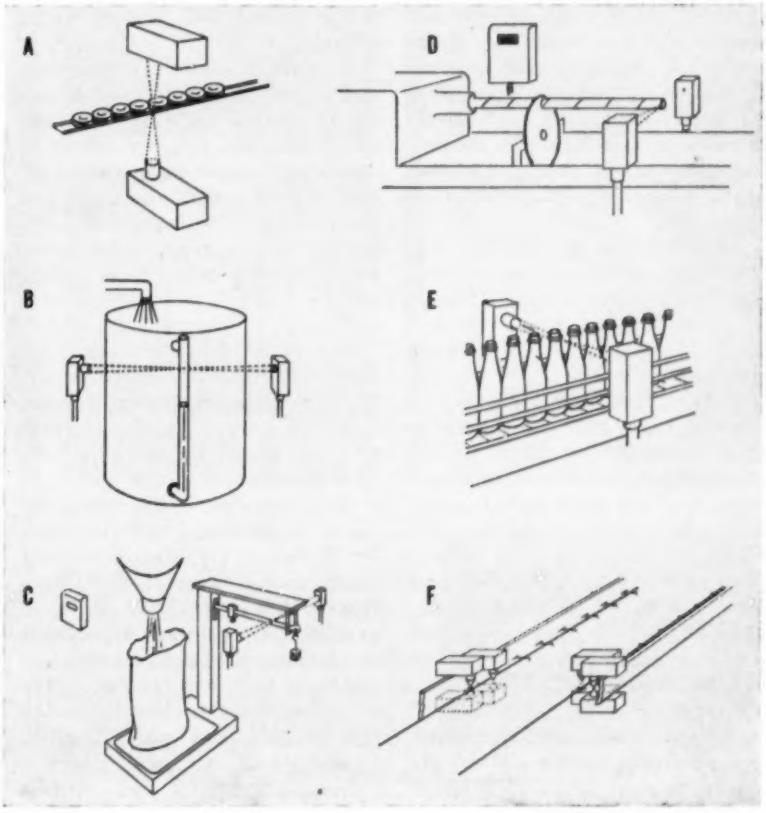
3. **Automatic** illumination controls can operate artificial lighting, indoors or outdoors, whenever natural light diminishes to a predetermined level. This type of installation would activate radio tower lights, street lights, beacon or obstruction markers, floodlighting installations, and illumination systems installed in offices, classrooms, railroad stations, or theatre canopies.

4. **When installed** across the stack of a heating plant, a photocell unit can sound an alarm whenever the smoke density indicates improper combustion.

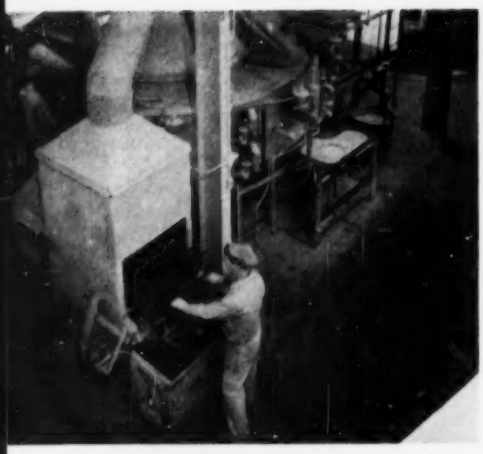
5. **Electronic supervision** can provide an automatic "receptionist" to announce the approach or arrival of a caller. In industrial plants, dangerous equipment could automatically be shut off if approached by a worker and, in a doctor's office, the privacy of the inner office would not be disturbed by the arrival of an unannounced caller.—Elec C&M, Jan, p94



DIRECTIONAL BEAM (upper right) may be used for (a) synchronizing conveyors, (b) vehicle warning, (c) counting store shoppers, (d) controlling container levels, (e) timing automatic processes, (f) controlling belts

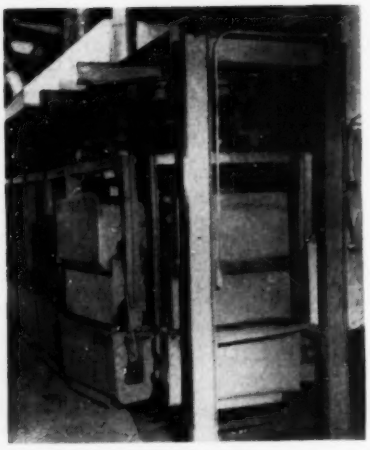


CROSS-OVER BEAMS (right) can (a) count small objects, (b) supervise liquid levels, (c) weigh container contents, (d) cut materials to exact length, (e) count bottles, (f) supervise material alignment



SHELL-MOLDING machine makes one shell mold every 15 sec.

CLOSING MACHINE joins shell halves by applying uniform pressure



POURING MACHINE carries mold boxes on monorail at 6 ft. per min.

Shell-Molding Foundry

Shift from green-sand to shell molding mechanizes foundry operations to cut costs and produce better castings with automatic equipment and conveyors

MECHANIZATION, made possible by shell molding, has brought Walworth Co. these advantages: greater efficiency, more flexibility, economy, and cleaner, safer working conditions. Its foundry specializes in mass production of valves, threaded pipe fittings, pipe flanges, and other parts cast in bronze, brass, aluminum, steel, and other alloys.

An automatic shell-molding machine turns out four resin- bonded sand shells every minute. Phenolic resins and sand are blended and fed to the eight-station rotary machine.

Mold patterns are preheated at the first three stations, the resin-sand mixture is poured at the fourth, curing is done in the next three, and the shell mold is automatically ejected at the last station. When molds have cooled, cores are inserted and the two mold halves are joined with adhesive in a closing machine applying a uniform pressure over the mold surfaces.

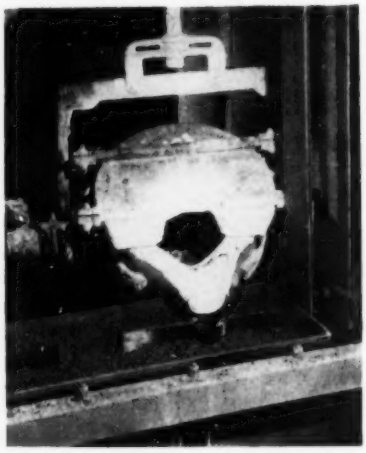
Conveyors carry assembled molds to storage racks or directly to the pouring machine. Molds are placed in steel boxes on a monorail conveyor. Steel shot is automatically poured into each box to support the shell during metal pouring.

Another monorail conveyor carries pouring ladles of 200-lb. capacity to the pouring machine. After pouring, the box moves to another automatic station at which shot, mold, and casting are dumped. Shot is recycled, and the casting and mold are transferred, again automatically, to a cooling conveyor and thence to a shakeout conveyor.

Walworth developed and designed the mold-assembly, pouring and casting machinery and the conveyor systems. It also markets this machinery, which is built by Link-Belt Co.

Other benefits, besides those already mentioned, were obtained by Walworth. Closer tolerances made possible with shell molding results in a substantial saving of cast metal. Design allowances can be shaved to get greater piece yield per mold. A further saving of casting metal is provided by the fewer gates and risers needed. Cleaning costs are lower.

Not so obvious but still a definite advantage is the lightweight of the molds. A green-sand cope and drag weigh up to 20 times as much as an assembled shell mold.



POURING LADLE on companion monorail conveyor pours mold

Shell molds can be made faster than they can be cast, so they are stored in convenient racks until they are needed. They can be stored almost indefinitely without warping or losing their accuracy. In the previous green-sand operation, operations had to be continuous because the heavy molds could not be stored.

Also of advantage are the lower requirements in floor space, storage space, and machinery, compared with that previously needed to handle the large volumes of sand involved in green-sand molding.—Iron Age, Jan 28, p55

WHAT DO THESE INDUSTRIES HAVE IN COMMON?

They have all called on Ebasco for services involving engineering, construction, or business consultation. In addition to these nine major industries, Ebasco has served many others all over the world.

The help provided by Ebasco varies with the requirements of the client. One project may call for the complete design and construction of a new plant. Another may require assistance on new financing, space planning services, a marketing and distribution study; or perhaps an industrial relations program. Still others may include advice on insurance, on safety, or on accounting systems and methods.

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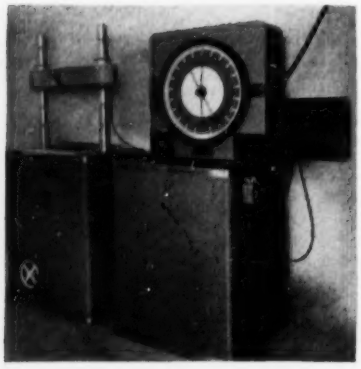
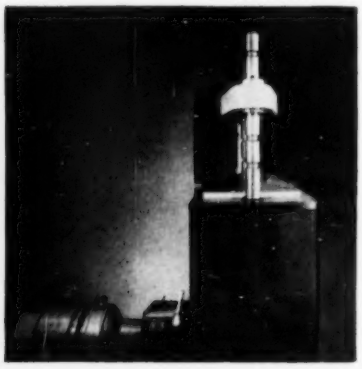




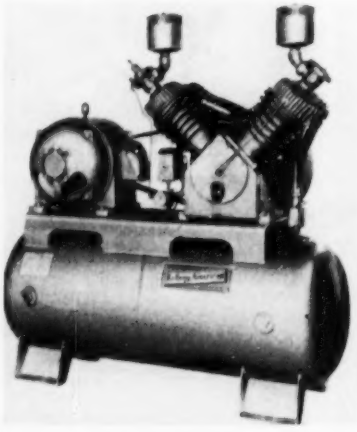
Versatile Universal Testing Machine Handles Large Variety of Testing Jobs

Model FGT production testing machine, when equipped with suitable accessories, can test specimens of structural parts in tension, compression, flexure, and while they are subjected automatically to alternating reversed loads, creep, stress, relaxation, torsion, and shock.

The tester has a capacity of 50,000 lb. in tension and compression. The top platen measures both plus and minus loads through side rods terminating in strain-gage load cells that read out in a curve without dwell at the inflection point. The bottom platen applies load to the test specimen fixed within the testing space by moving in either direction, up or down.

The load cycling system allows automatic load reversal. By adjustment of control points by two indicating knobs, cycling may be kept within the tension and compression range or entirely within one range. Cycling rate depends on strain amplitudes within the machine's speed limits—normally 9 in. per min. up to 10,000-lb. load, 4 in. per min. to 30,000 lb., and 2 in. per min. to 50,000 lb.

Accessory equipment available include: torsion testing attachment, sheet-metal and wire grips, specimen holders, equipment for testing at high and low temperatures, and testing tools and fixtures made of plastics and wood. —**Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.**—Prod Eng, Feb, p215



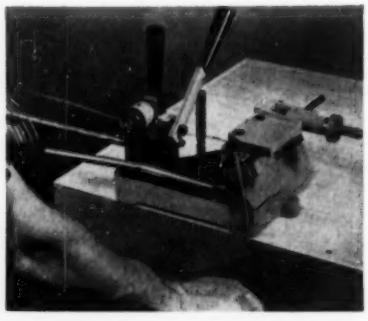
V-Type Air Compressors

Four-cylinder, two-stage air compressors of 15 and 20 hp. have been added to the Kellogg-American line. The 22 models available cover a wide range of applications. The tank-mounted unit shown, model BD461A, features dual controls that permit automatic stop-start operation for intermittent use or automatic intake unloader operation for use where air demand is constant. — **American Brake Shoe Co., 230 Park Ave., New York 17, N. Y.**—Paper Ind, Jan, p1147

Conveyors Save Power

Complete line of "Balanced, Dual Trough" vibrators for conveying and/or screening of bulk materials, hot or cold, dry or damp, abrasive or corrosive, is now available. Unit requires maximum power only when starting.

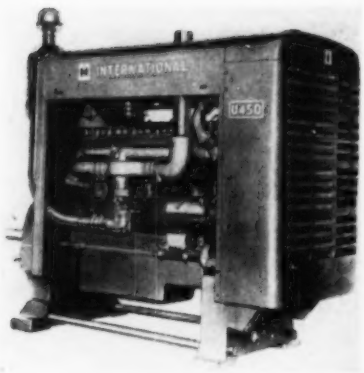
Vibrating conveyors, which are also fitted with screen sections, are available in two capacities: model 2-B, with 60-ton-per-hr. capacity, 65 ft. long with 20-in. troughs. Also sections up to 30 ft. long with 40-in. troughs are available in this model. Model 6-F has 280-ton-per-hr capacity in sections up to 175 ft. with 20-in. troughs and up to 100 ft. with 40-in. troughs.—**Syntron Co., Homer City, Pa.**—Coal Age, Jan, p100



Spring Winding Machine

New spring winding machine is a self-contained unit with a built-in cut-off lever. It is recommended by the maker to form individual springs or to replace automatic machines on expensive short-run production.

Any gage wire, to ¼-in. dia., can be wound into extension, compression, torsion and flat springs. Round, flat, square or rectangular shaped stock can be formed into springs of any length.—**O'Neil-Irwin Mfg. Co., Lake City, Minn.**—Ind Dist, Feb, p142

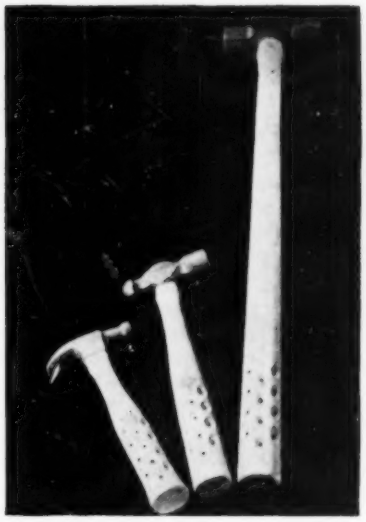


New Engines Added to Line

Seven carbureted models have been added to International's line, which now includes 18 diesel, gasoline or gas models ranging from 16½ to 200 hp. The new valve-in-head engines and horsepower ratings are: U-1091—180 to 200 hp.; U-450—102 hp.; U-406—91 hp.; U-372—83 hp.; U-269—62 hp.; U-240—55 hp.; and U-220—50½ hp. Model U-1091 operates on natural gas, the others on gasoline. U-1091 has a large updraft carburetor. —**International Harvester Export Co., 180 N. Michigan Ave., Chicago 1, Ill.**—Oil & Gas J, Jan 11, p139

Air Conditioner

Leader Model consoles for 1954 include cooling thermostats on 1-hp. units and both electric heat and cooling-heating thermostats for automatic control of room temperature on 1½-hp. units. Where water and drainage are a problem, the air cooler unit may be used. Water-cooled models are for use where openings to an outside air supply are unavailable. All consoles are supplied for 230-volt dc. and for 208- and 230-volt, single- and three-phase, 60-cycle ac.—**Remington Corp, Auburn, N. Y.**—Elec C&M, Feb, p131



No Slip, No Blister

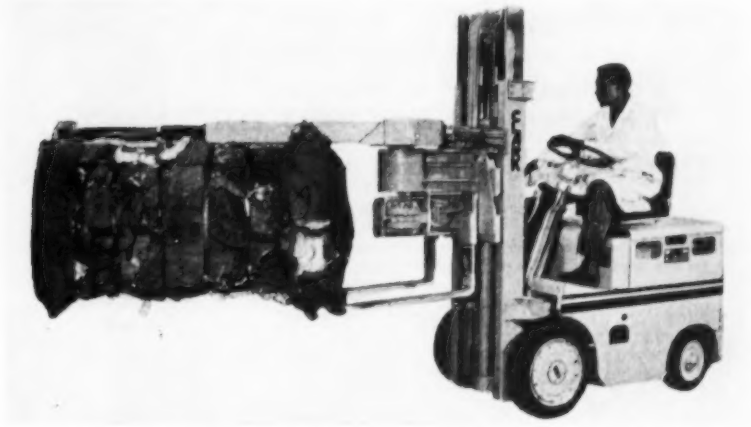
Those little holes in the hammer handles above are supposed to: (1) keep the hammer from slipping out of a sweaty hand and (2) prevent blisters. The manufacturer calls it a vacuum grip. Ampco's entire hand-tool line will be equipped with them.—**Ampco Metal Inc., 1745 S. 38th St., Milwaukee 46, Wis.**—Business Wk, Jan 16, p108

Mechanical Rectifier Unit

You can expect 96% efficiency from a new mechanical rectifier unit substation for converting alternating current to direct current. This figure includes losses in transformers, switchgear, and other associated equipment.

For safety, the unit is enclosed in a metal shield. For easy inspection and maintenance, it has draw-out facilities. And it fits into a substation line-up.

Units giving up to 1,200 amp. at d-c. voltages up to about 250 are available. Above this, ratings are 6,000 amp. up to approximately 500-volts dc. For higher currents, units can be parallel-operated.—**International General Electric Co., 570 Lexington Ave., New York 22, N. Y.**—Factory, Feb, p160



Swinging Clamp Device Works in Narrow Aisles

Swinging clamp attachment can reach out to either side of a narrow aisle to grasp or tier loads behind material already stacked. Maximum capacity of the attachment is 600 lb., regardless of truck capacity. Clamp device has a full 180° traverse for flexible handling. — Clark Equipment Co. Battle Creek 73, Mich.—Textile World, Jan, p140

Here They Are!

REMINGTON'S NEW

Tropic-Tested

ROOM AIR CONDITIONERS

Especially Developed For The Hottest Parts Of The World

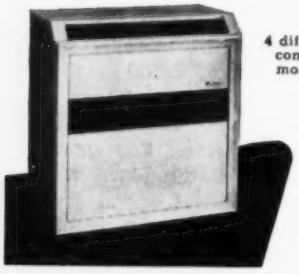
5 different window models

Here are room air conditioners that are designed especially for the hottest and most humid climates—and priced no higher than units designed for use only in temperate zones.

Only Remington offers a complete line of window and console models—all voltages, AC and DC—full-rated capacities at 50 and 60 cycles—Air cooled and Water cooled—in "a size for every room at a price for every purse."

Thousands in use in 62 countries—Remington's 16 years of experience specializing in room air conditioning—every unit backed by a definite service plan plus a 5-year warranty on the Hermetic Cooling system—these are your guarantee of quality.

Remington is selecting active distributors for a few choice territories still available.



4 different console models

WRITE: Factory Export Department MG-4

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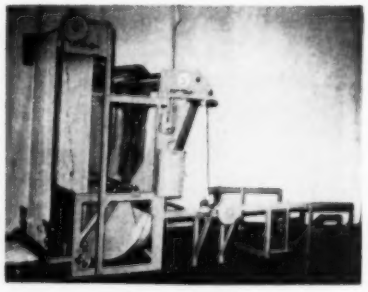
Fast-Connection Valve

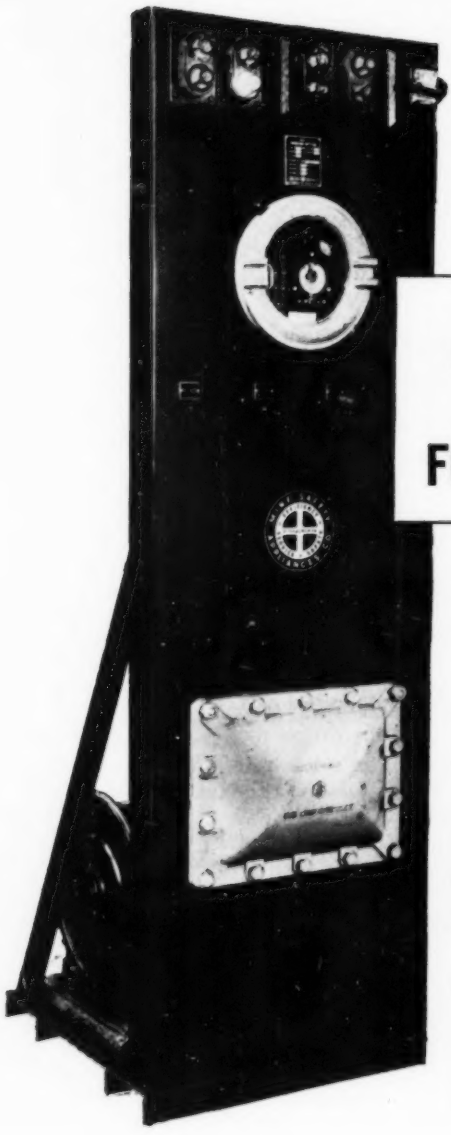
Lubricated plug valve can be connected quickly to grooved pipe ends. Lines may be dismantled as often as necessary without damage to pipe or end couplings. The valve is operated by wrench, has pressure rating of 175 lb. per sq. in., and is available in 2-, 2½-, 3-, and 4-in. sizes. The flexible design allows deflection of several degrees at every joint.—**Nordstrom Div., Rockwell Mfg. Co., 400 N. Lexington Ave., Pittsburgh 8, Pa.** —Pet Proc, Feb, p280



New Continuous Roll Feed

Model G continuous roll feed makes it possible for an operator to sew on new rolls of cloth during continuous top-speed operation of printing machines and frames. In time, labor, and cloth, the device can save over $100 per machine per shift.

The continuous roll feed is an automatic scray equipped with controls that maintain a steady flow of goods. A large yardage is stored in a compact space; and hand feeding, uneven tension, dirt, bad seams, and other sources of waste are eliminated.—**Mount Hope Machinery Co., 15 Fifth St., Taunton, Mass.**—Textile World, Feb, p137



M.S.A. COMBUSTIBLE GAS ALARM

Provides a means of continuous analysis and control of potential explosive and toxic hazards before they become critical. This instrument operates on a balanced electrical bridge circuit principle. Audible and visible alarm alerts personnel, and at the same time, energizes external control circuits until the condition is corrected. Explosion-proof housing. Listed by Underwriters' Laboratories, Inc. for use in hazardous locations. Write for complete details.

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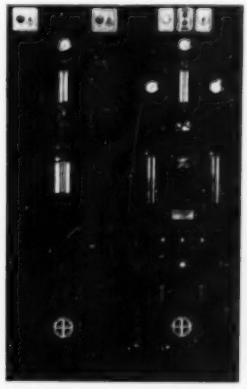

M.S.A. CARBON MONOXIDE RECORDER

For extremely precise measurement and recording of very low concentrations of carbon monoxide in air and gases. When predetermined limits are reached, this instrument operates warning signals, ventilation controls, proportioning valves, etc. Write for complete details.

M.S.A. INFRA-RED GAS AND LIQUID ANALYZER

For automatic analysis of fluid mixtures, measurement of toxic contaminants in air, precise process control. This device (Lira Type) makes a continuous analysis of one component of a mixture. Extremely stable. Ideal for production control, research problems. Write for complete details.

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ALSO

M.S.A. OXYGEN RECORDER (Type C)—This instrument produces a continuous record of oxygen concentrations in gaseous mixtures, and may be used for automatic control over combustion and other production processes. Analysis of oxygen in inert atmosphere; measuring combustion efficiency.

M.S.A. also makes a complete line of portable instruments for appraising Hydrogen Sulphide, Aromatic Hydrocarbons, Sulphur Dioxide, Hydrocyanic acid and other gas and dust hazards. Write for complete details.

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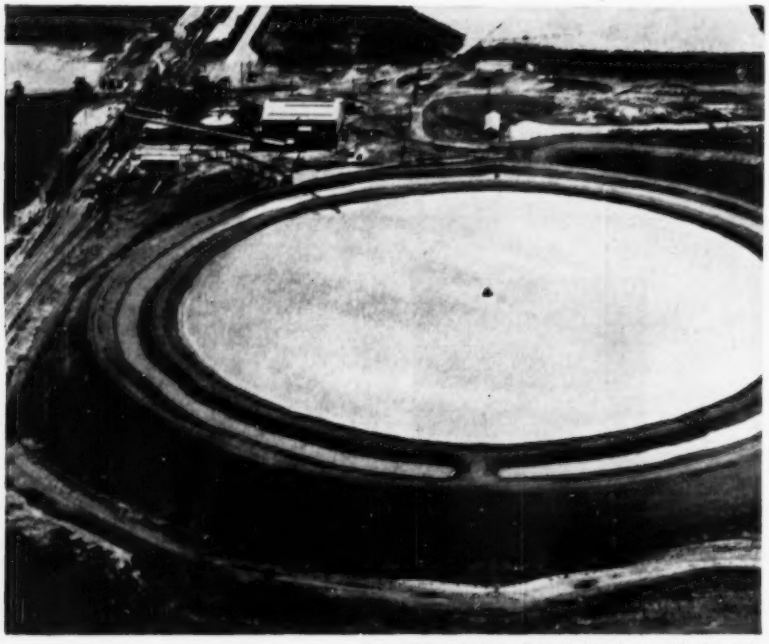

Largest installation of its kind in the world, this sedimentation unit handles 900,000 gallons per hour.

Problem was to clarify phosphate rock tailings carrying 2% solids — on a budget. Our answer, after thorough field study and testing, was this special 300 foot dia. Dorr Thickener mechanism installed in a 750 foot earthen basin. The results — economically accomplished — are an overflow suitable for re-use and an underflow thickened to 12-15% solids which can readily be impounded.

And sedimentation isn't the only unit operation where our specialized equipment and knowledge pays off.

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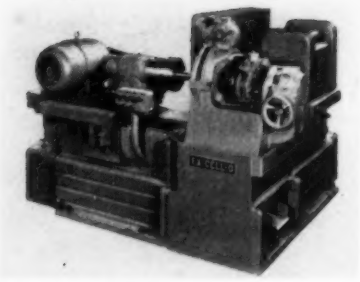


Two-Way Boring Machine

Precision boring machine with two way units at 90° angle bores cylinders and crank-bearing diameters simultaneously on refrigeration- compressor block. Way angle is held within 0.001 in. at 14 in. The table of one way unit supports single spindle having tools to machine bearing diameters. The second way unit supports spindles that bore cylinders.—**Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.**—Am Mach, Dec 21, p148

Ultra-Thin Bronze

Phosphor bronze is now available in ultra-thin gages, precision-rolled to very close tolerances and to thin gages and foils for electrical-equipment manufacturing. The metal possesses high tensile strength, good ductility, resiliency, wear resistance, and good bearing qualities. It is rolled in strip up to 6 in. wide and down to 0.005 in. in thickness. Typical uses are diaphragms, springs, brushes, sleeve brushings, printed circuits, bourdon tubes, and clutch discs.—**American Silver Co., 36-07 Prince St., Flushing 54, N. Y.**—Electronics, Feb, p310

Hydraulic Press

Designed for both laboratory and production use where controlled heat and pressure are required, new small, compact hydraulic press accommodates 12 x 12-in. platens.

Press is electrically heated and air operated. Each unit is equipped with individual controls that allow regulating hydraulic pressure for each operation with the touch of a finger, within a range of 50 to 4,000 lb. per sq. in. —**Atlas Hydraulics, Inc., 3576 Ruth St., Philadelphia 34, Pa.**—Modern Plastics, Jan, p147

NEW PRODUCT BRIEFS

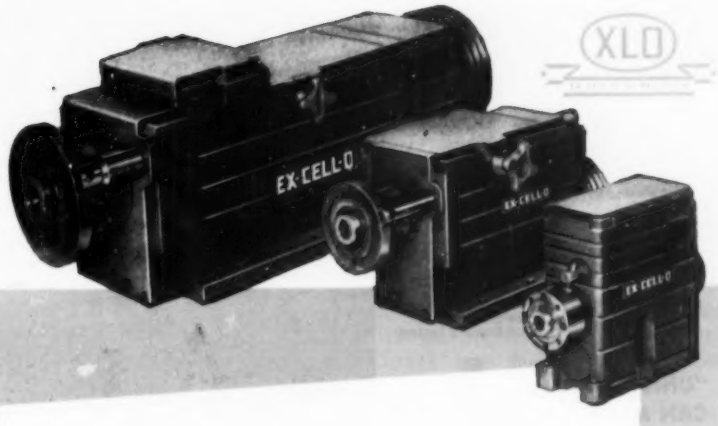
Gives Direct Yarn Readings—Automatic evaluator gives a direct reading with the uniformity analyzer made by the same company. The automatic evaluator gives complete non-uniformity data from a 1,000-ft. sample of yarn in 3½ min. It is applicable to all new and modified analyzer units.—**Brush Electronics Co., 3405 Perkins Ave., Cleveland 14, Ohio.**—Textile World, Jan, p146

Electric Impact Tool—New impact tool is designed to save time and effort on nut running, tapping, screw driving, reaming, drilling. Tool is rated for nut running up to ½-in. bolt size. It weighs only 5 lb. and is 9¾ in. long.—**Ingersoll-Rand Co., Phillipsburg, N. J.**—Const Meth & Equip, Feb, p162

Small Parts Hardener—Small, lightweight parts can be continuously hardened in new radiant-tube, gas-fired, shaker-hearth furnace. Work is loaded on the hearth at the front of the furnace. Reciprocal motion of the shaker charger moves parts through the heating chamber until they are discharged into a quench tank. Production is 400 to 600 lb. per hr.—**Westinghouse Electric International Co., 40 Wall St., New York 5, N. Y.**—Auto Ind, Jan 1, p83

Level Control for Bins—Device offers dependable, trouble-free control of coal and other materials in storage bins, ducts, or chutes. A sealed housing containing a switch is placed on the outside of the bin. A sensing probe, connected to the switch, extends into the bin. Only the probe comes in contact with flowing material.—**Scrayco, 201 Greene Ave., Bound Brook, N. J.**—Coal Age, Feb, p133

Drains Corrosive Liquids—New stainless-steel float trap will drain corrosive liquids from air, gas, and steam confined in piping systems. It does not allow air or gas to escape while liquid is being drained and is designed for 300-lb. pressure and 800°F. maximum temperature.—**V. D. Anderson Co., 1945 West 96th St., Cleveland 2, Ohio**—Factory, Jan, p172



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Ex-Cell-O Power Units feed or rotate tools in easily controlled automatic cycles. A single tool can be held in the unit spindle or a multiple head can be bolted to the quill flange. The Units are used in low-cost, high-production machines for such operations as drilling, reaming, counterboring and spotfacing. A typical machine consists essentially of a plain base, a work-holding fixture and one or more power units.

Ex-Cell-O Units are self-contained and compact; can be mounted horizontally, vertically with the spindle nose down, or at any angle between these positions.

Ex-Cell-O styles 28-A, 21, and 20 Quill-Type Hydraulic Power Units are shown above. They are standard models. Send for *all* the facts about them. Write or cable Ex-Cell-O for Bulletin 45828.

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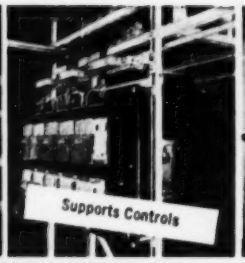

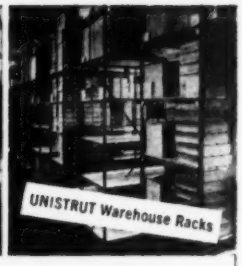

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MANAGEMENT REPORT

European Coal Steel Community (Schuman Plan) is facing a concerted cartel on export prices from steel exporters in Belgium, Luxembourg, Germany, France, and Holland. This price cartel violates the spirit of the plan calling for free price competition. And it is reported that the steel exporters intend to divide up the export market and fix export quotas.

ECSC's High Authority has asked the steel exporters to break up the cartel voluntarily. No action has yet been taken to do so. If none is taken, the pool faces two dangers: a possible $500-million loan from the U. S. is jeopardized and the cartel agreement cannot help but affect domestic European steel prices.—Iron Age, Dec 24, p22

Ringsby Truck Lines Inc., interstate truckers, went from the red into the black and volume of business remained constant. These innovations did the trick: (1) it clarified all company procedure; (2) it pin-pointed and specified all jobs; (3) it developed a system for improving company procedure.

The company began its streamlining with a standard operations manual. The results were:

- Uniformity of work performance.
- Reduction of training-period time for new employees.
- Reduction of friction between members of the organization.

Most of all, the operation manual cleaned house. Detail work on the manual brought out short cuts and steps that could be eliminated. In one terminal two complete work forces were found to be doing the same job.—Fleet Owner, Jan, p54

An atomic locomotive is coming, but don't put off buying diesels because it will be a long time coming. Such an engine has been designed at the University of Utah. The design outwardly resembles a conventional diesel. At the center is a 200-ton protective steel shield enclosing a small atomic fuel boiler system.

The locomotive would use a fuel of uranyl sulfate in a water solution to generate heat and produce steam. Electricity would then be generated to drive the 7,000-hp. unit. Estimated fuel consumption would be 11 lb. per year at $9,000 per lb. That is about equal to the diesel fuel bill for a four-unit 7,000-hp. diesel.

Canada's annual International Trade Fair is headed for another big year. Businessmen from all over the world expect to be in Toronto May 31 to June 11 for the fair. There they will have an opportunity to meet Canadian businessmen and also see what the rest of the world is doing. The fair again will provide an opportunity for overseas businessmen to break into the North American market.

If you want more information, contact your Canadian Trade Commissioner or Consul, or write Canadian International Trade Fair, Exhibition Park, Toronto 2-B, Ontario, Canada.

Top management team from the U. S., on month-long inspection of West Berlin industry, found it advanced on technology, backward on marketing. In apprenticeship training, social programs, use of disabled persons, manufacturing methods, and plant layout, West Berlin industry has many outstanding examples. But it falls behind in the area of wages, hours, labor-union relations, product design, market development, consumer research, and selling techniques.—Am Mach, Feb 1, p143

Bettering its plant-safety record was Clark Controller Co.'s goal. So it resorted to this unique scheme. Reports of the safety committee, including specific listing of accident hazards anywhere in the building or grounds, are posted on all bulletin boards. The reports stay up until the plant engineer notifies the committee that the condition has been corrected.

A combination of good-natured joking and a natural desire to avoid this particular type of publicity produce the following result: the reports do not stay up for long.—Factory, Feb, p120

Mechanical translation is now in sight. International Business Machine Corp. recently demonstrated a keyboard machine that translated Russian into English. The machine is "fed" by a punched IBM card. The answer comes out, at a rate of two and a half lines per sec., on an automatic printer in English. More development work on the method will eventually permit the rapid mass translation of literature.

There is no question about plastics being a growth industry. Curves show a growth of 15% annually over the last 25 years, and 20% per year over the last 17 years. What does the future hold? According to Stanford Research Institute you can expect an annual average increase of about 10% to 1957 based on 1950 values.

Just one thing can limit plastics future growth. Industry needs new plastics. But today the chemist is having trouble imagining how these needs can be filled.—Mod Plastics, Feb, p129

PRODUCTION IDEAS

from Manufacturers' Catalogs

Turret Lathe—Features of model 4-V automatic turret lathe are discussed in folder 153.—Potter & Johnston Co., Subsidiary of Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford 1, Conn.

Boiler Feed Control—Bulletin 1013 illustrates and describes a three-influence, instrument-type boiler feed control for high-duty boilers. Instrumentation is by Taylor Instrument Cos.—Copes-Vulcan Div., Continental Foundry & Machine Co., Erie 4, Pa.

Silicon Carbide—Booklet "Facts About Silicon Carbide" discusses properties and manufacturing techniques for silicon carbide products other than those used as an abrasive.—Carborundum Co., Niagara Falls, N. Y.

Plant Case History—How a Swiss non-ferrous metal-producing plant was modernized is discussed in English, French, and German in Bulletin 26.—E. W. Bliss Co., 1375 Raff Road S. W., Canton, Ohio

Describes Gear Material—Booklet 42 describes and illustrates many Mechanite gear applications and goes into detail on the subject of gear casting design.—Mechanite Metal Corp., 714 North Ave., New Rochelle, N. Y.

Waste Pumps—Features, performance information, specifications, and selection data are given in booklet W-52 for plunger sludge pumps, mud-log diaphragm pumps, and self-priming centrifugal pumps for sludges and slurries.—Marlow Pumps, Ridgewood, N. J.

For Process Industries—Wide range of insulations, refractories, asbestos-cement pipe, packings, gaskets, and metal raschig rings is discussed in booklet IP-28A.—Johns-Manville International Corp., 22 E. 40th St., New York 16, N. Y.

Elevator Buckets—Cast malleable and Promal elevator buckets for handling coal, coke, ores, grain, cement, chemicals, pulp, clay, sugar, salt are described in booklet 2465.—Link-Belt Co., Export Div., 2680 Woolworth Bldg., New York 7, N. Y.

Ammonia Process—Yield and cost advantages, principal operating features, and economics of process design for ammonia plants are outlined in booklet "Ammonia Plants."—M. W. Kellogg Co., 225 Broadway, New York 7, N. Y.

High-temperature Piping—A complete series of tubing steels for use in high-temperature and high-pressure service is described in Technical Data Card 163. Mechanical and physical properties, creep strength, tensile properties are also included.—Tubular Products Division, Babcock and Wilcox Co., Beaver Falls, Pa.

Horizontal Extrusion Presses—General information of various types of extrusion presses for both ferrous and non-ferrous metals are available in Bulletin 14.9—Lake Erie Engineering Corp., Box 68, Henmore Station, Buffalo 17, N. Y.

Cellular-glass Insulation — "Foamglass," a four page folder, gives physical properties, shapes available and recommended thickness for glass insulation. It also includes photographs of applications and suggested specifications.—Pittsburgh Corning Corp., 1 Gateway Center, Pittsburgh 22, Pa.

Snow Melters—Bulletin DB-28-030 describes snow melters for track switches on city transit systems, electrified and non-electrified.—Westinghouse Electric International Co., 40 Wall St., New York 5, N. Y.

Air-cooled Kiln End—Discharge ends of kilns can be kept cool, round and rigid with air-cooled kiln end described in bulletin 07B8040.—Allis Chalmers Mfg. Co., Export Dept., Milwaukee 1, Wisc.

Automatic Control Services — A unique special engineering service for making plant operations automatic is described in new brochure entitled "A Proposal for Management with Vision."—CDC Control Services Inc., 4005 Warminster Rd., Hatboro, Pa.

Complex Plane Analyzer—A six page bulletin is now available on a type 250-A Complex Plane Analyzer, a computor for network analysis and control-system design. Detailed information on the instruments theory and operation is included in the bulletin.—Technology Instrument Corporation, Main St., Acton, Mass.

Wax Emulsions—The role of wax emulsions for paper sizing is the subject of a booklet entitled "Paracal." It contains pertinent data on types of wax emulsions available and their use in internal and surface sizing.—Hercules Powder Co., Wilmington 90, Delaware.

Industrial Filtration—Ten basic types of industrial filtration equipment are discussed in bulletin A-943. Equipment reclaims and repurifies oils, coolants, solvents and industrial water.—U. S. Hoffman Machinery Corp., Thompson Road, Syracuse 6, N. Y.

Industrial Locomotives — Bulletin GEA-6009 lists all users of General Electric industrial locomotives other than those in the U. S. and Canada. Performance charts and curves on each size locomotive are given.—International General Electric Co., 570 Lexington Ave., New York 22, N. Y.

Thermometer Controller—Pneumatic thermometer controller is described in bulletin 6401. Also shown are applications and features of this automatic control instrument. — Minneapolis-Honeywell Regulator Co., 2747 Fourth Ave., Minneapolis 8, Minn.

Insulating Wool—Folder VFW-1 describes properties and applications of lightweight glass-fiber insulating wool.—Glass Fibers Inc., Toledo 2, Ohio

Tool Grinder—Features and specifications for model GW30 hydraulic tool and cutter grinder are given in catalog 1015E.—W. Ferd. Klingelnberg Sohne, Remscheid, Germany.

Industrial Maintenance Supplies — General catalog discusses company's line of protective coatings, cements, firebrick and structural specialties.—G. F. Sterne & Sons Ltd., Brantford, Ontario, Canada.

Milling Machine—Plain and universal milling machine featuring adjustable cutterhead and movable ram is discussed in folder 24-M.—Van Norman Co., Springfield 7, Mass.

Ultrasonic Testing—Bulletin 50–105 tells how ultrasonic testing "Reflectoscope" improves quality, reduces costs, anticipates breakdowns. — Sperry Products, Inc., Danbury, Conn.

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Arthur W. Hooper
Editor, Electrical Wholesaling

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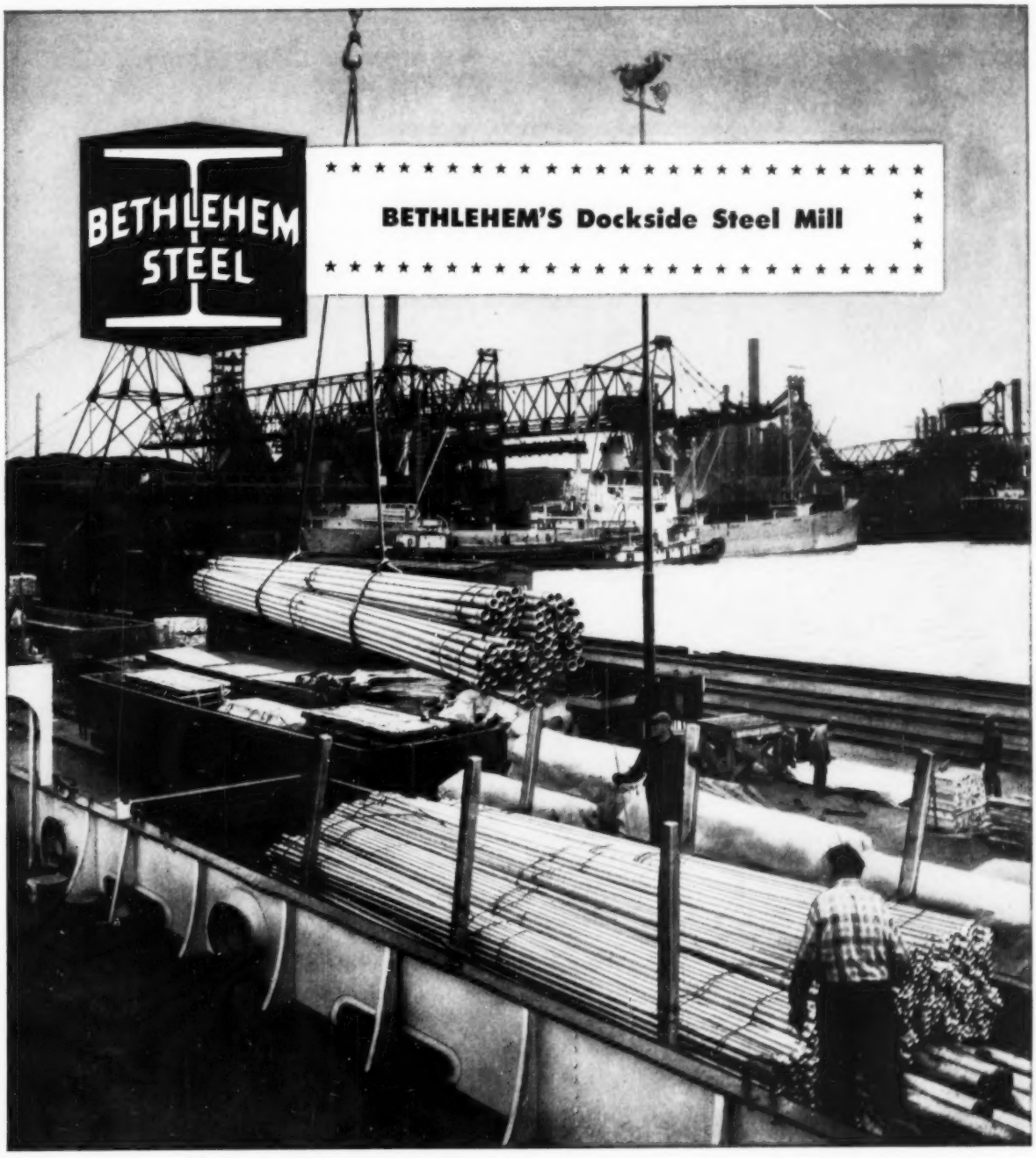

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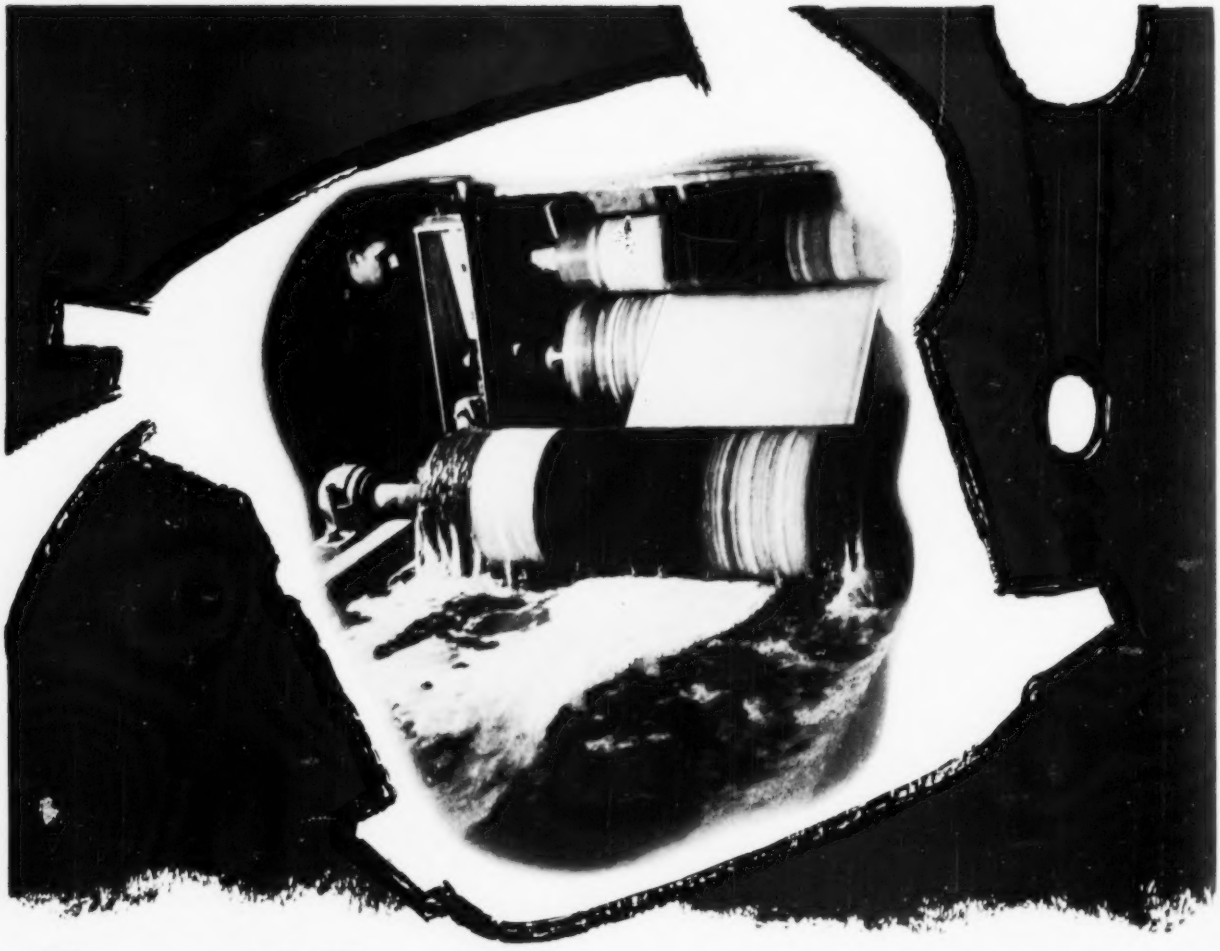

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